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THE HISTOGENESIS OF THE HYDATID PARASITE (TÆNIA ECHINOCOCCUS) IN THE PIG.

BY HAROLD R. DEW, F.R.C.S.,

Honorary Surgeon to Out-Patients, Melbourne Hospital (from the Walter and Eliza Hall Institute, Melbourne).

THE DEVELOPMENT OF THE TÆNIA ECHINOCOCCUS FROM EMBRYO TO HYDATID CYST.

Introduction.

WE are indebted to Leuchart[1] for the first true explanation of the life cycle of the hydatid parasite and as far as English literature is concerned, his description is still the only one followed. He infected four sucking pigs with the ova of *Tænia echinococcus* and made careful observations on the resulting cysts in the liver. He noted that these were most frequently present in the interlobar spaces and particularly beneath the peritoneal coat. In one pig four weeks after feeding the liver was studded with small tubercular-like nodules which had a thick homogeneous capsule enclosing semi-solid granular contents. These had a diameter of 0.35 millimetre. At the end of eight weeks the parasite was a millimetre in diameter, showed slight lamination of the outer layer, possessed a well marked inner germinal layer and contained fluid which escaped from it on puncture. Leuchart did not make use of serial microscopical sections and consequently was not able to study the very early stages of the parasite.

The present investigation was undertaken particularly to investigate these earlier stages. The French literature contains the work of Dévé[2], but there is nothing in English concerning this phase of the development of the parasite. To some extent this work is a repetition of that of the French authority, but some new observations are added.

Material and Methods.

A supply of mature tæniæ and ova were obtained from artificially infected dogs. At first four dogs employed by drovers at the city abattoirs were obtained and given areca nut and castor oil in the hope that enough mature tæniæ would be obtained for experimental purposes. This method proved very disappointing as only eight complete specimens were obtained. Resource was then had to puppies experimentally infected by feeding with mature scolices procured from the cysts of the lung and liver of the sheep. The scolices were collected by sedimentation from the fluid contents of the cysts and examined for viability under the low power of the microscope after warming with hot saline solution, which in living scolices causes active movement. In all six dogs were thus infested, each receiving half a test tube of hydatid "sand."

The first dog which was killed after a period of thirty-six days, was found to have a great number of *Tæniæ echinococci* in the small intestine, but practically all these were immature and none contained mature ova. The remaining dogs were killed after a lapse of two months and in every case a plentiful supply of mature worms and ova was procured.

A series of sucking pigs, aged six weeks, were fed by means of a pipette with an emulsion of ripe proglottides warmed in milk. In all cases the presence of ova was determined microscopically and extremely heavy infestation was aimed at by giving many thousands of ova in each dose. These pigs were killed at varying times after infestation. The liver was examined, fixed in Zenker's fluid and serial sections were cut.

In this way sections of liver showing the hydatid parasite were obtained twelve and twenty-eight hours and then three, seven, fourteen, twenty-one, twenty-eight, ninety and one hundred and fifty days after infestation. The pigs which were kept for the later stages, were also investigated by Dr. Kellaway with regard to the early immunological reactions.

Route Taken by the Embryo.

The hexacanth embryo hatches in the stomach and by actively boring into the wall, makes its way into small radicles of the portal vein whence it is carried to the liver. In order to explain the peculiar examples of this disease in which the liver has escaped, many alternative routes have been supposed to exist. It has been suggested that the parasites pass through the biliary passages from the duodenum or through the sub-peritoneal tissues. The great frequency of extra-hepatic infestation in some animals, such as the squirrel, has led some investigators to postulate the existence of aberrant anastomotic veins leading from the stomach into the thoracic veins. All these hypotheses seem to be entirely unnecessary and rest on no direct observations and the evidence presented here makes it evident that in the pig at all events the parasite reaches the liver through the portal vein.

A pig, weighing nine kilograms, was given at 8 a.m. and at 10 a.m. extremely heavy doses of mature proglottides. The animal was killed by a blow on the head at 4.30 p.m. and was not bled in the usual way. The abdomen was rapidly opened, the portal vein was tied at the head of the pancreas and the inferior *vena cava* clamped. The liver was then removed and the portal vein milked of its contents into a large centrifuge tube containing distilled water. After hæmolysis the fluid was centrifuged. The sediment was examined in the wet state and two hexacanth embryos were discovered. They were readily recognized by their size—$30\mu \times 25\mu$—and by the presence of hooklets. In neither case were the hooklets complete and one embryo had only two left attached. It would appear that, unless the trauma of centrifugalization caused the separation, the useless hooklets are shed soon after piercing the stomach wall.

The direct evidence of the presence of parasites in the portal vein and the regular demonstration of the parasite in the liver within a few hours of feeding demand for their explanation a rapid means of entry which cannot be provided by any of the hypothetical alternate routes.

Site of Implantation in the Liver.

The embryo is carried to the liver and may come to rest anywhere in the liver lobule. Leuchart stated that he found the favourite site to be the interlobar tissue, but as Dévé has pointed out he did not make any observations while the parasite was still of microscopic size. When this is done, as in the present investigation, it is found that the most frequent site is in the substance of the liver lobule about a third of the way towards the centre from the periphery. Very often the embryo is found much closer to the centre of the lobule and Dévé has actually seen it in the central vein. There is no doubt that the parasite frequently passes the hepatic filter and enters the inferior *vena cava*. It appears to retain a fair degree of active mobility and, since the liver capillaries are readily distended, this hepatic "filter" may not be nearly so efficient as is usually supposed.

Great variation certainly exists in the diameter of the hepatic capillaries in different animals. This appears to be the only reasonable explanation of the fact that in the squirrel, for example, after infestation 98% of the resulting cysts appear in the lung.

In the pig the great proportion of the parasites come to rest in the substance of the hepatic lobule and show a striking predilection for those lobules situated close under the peritoneal coat of the organ.

Stages of Development in the Experimentally Infested Pig.

The following is an account of the various stages of development in the liver of the experimentally infested pig. There are many factors which presumably influence the rate of development of the parasite. The age of the infested animal is obviously important. In a very young animal the times may be somewhat shortened, because the mere mechanical obstacles to the parasite, such as thickness of the stomach wall and the distance from stomach to liver *viâ* the portal vein, are very much less. The individual resistance of the pigs, varying vitality of the parasite, seasonal variations and variations in the state of the digestive organs of the pig may all be possible factors in inducing delay in the development in these early stages. That these various factors must be considered is apparent because even in the same infestation great variations in the stage of development are seen in different parasites. This description, therefore, must be taken as referring to the above experiment only, that is experimental infestation of pigs, aged six weeks, of an average weight of 6.8 kilograms in mid-winter. In each case the most advanced follicle seen at the particular stage is described and regarded as the optimal development of the parasite in a given time.

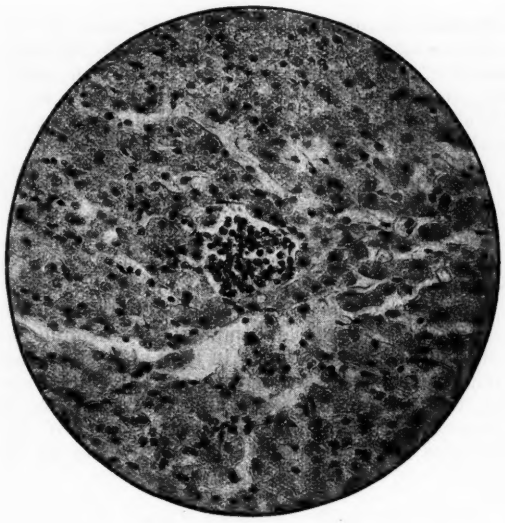


FIGURE I.

Hydatid follicle at twelve hours after infestation, showing accumulation of mononuclear cells hiding the parasite (ocular 2, objective 7; reduction, eight-ninths).

The Twelfth Hour.

The earliest stage observed in the liver was after a lapse of twelve hours. No doubt under ideal conditions the parasite may reach the liver earlier than this, because it can be discovered in the portal vein after six to eight hours. No definite parasite could be detected in the liver at the eighth hour.

At the twelfth hour stage (Figure I.) the parasite is hidden from view by a small accumulation of mononuclear cells. This accumulatiton of cells is the beginning of the hydatid follicle. The cellular reaction on the part of the host consists of mononuclear cells originating from the local connective tissue and the endothelial cells of the liver.

There are, however, a few cells of leucocyte type present. There is no indication as yet of polymorpho-nuclear eosinophile reaction which is such a feature in the later stages and which is typical of all helminthic lesions. There is evidence of the elaboration by the parasite of a diffusible toxin which manifests itself by cytolytic and karyolytic changes in the liver cells surrounding the follicle. These cells become opaque and non-granular and their staining reactions alter. The cytoplasm becomes much more acidophile and stains deeply with eosin. Iodine staining shows that the cell has become deprived of most of its glycogen. The nuclei show some breaking up of the chromatin network.

In the most advanced follicles there is a slight degree of vascular reaction and the neighbouring capillaries show increased numbers of corpuscles, but as yet there is little or no diapedesis.

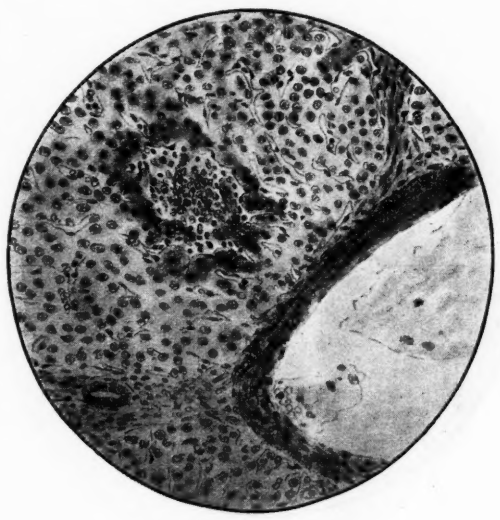


FIGURE II.

Hydatid follicle at twelve hours in close proximity to a sub-lobular vein (ocular 4, objective 7; reduction, four-fifths).

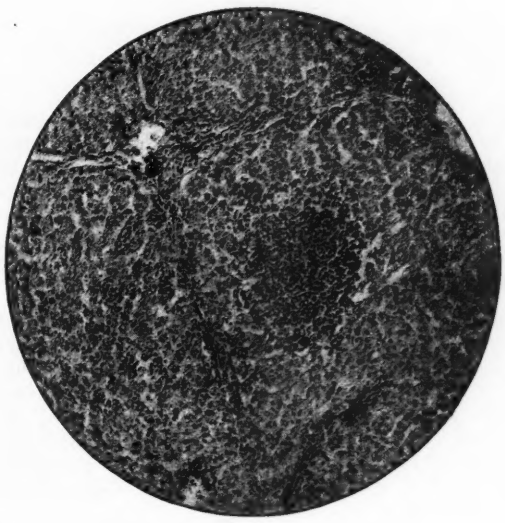


FIGURE III.

Hydatid follicle at twenty-eight hours, showing thick feltwork of accumulated mononuclear cells which hide the parasite (ocular 2, objective 3; reduction eight-ninths).

At Twenty-eight Hours.

In the stage of development at twenty-eight hours (Figure III.) the follicle has grown much larger by the accumulation of mononuclear cells and lymphocytes. The cells making up the follicle are a little more diffusely arranged, but still form a thick feltwork which effectually hides the small parasite from view.

The cells of the tubercle are still mainly fixed tissue mononuclear cells, but peripherally lymphocytes are seen and in some a few eosinophile cells, evidence of the reaction to the specific helminthic toxin. The liver cells in direct contact with the



FIGURE IV.

Hydatid follicle at twenty-eight hours, showing thick feltwork of mononuclear cells and lymphocytes and toxic changes in liver cells (ocular 2, objective 7; reduction, four-fifths).

follicle often appear dissociated from each other, the hepatic columns are broken up and scattered and hepatic cells may be seen among the cells of the follicle. In addition these cells show distinct cytolytic and karyolytic changes which are, however, much more advanced than in preceding stages, although they rarely extend beyond two or three liver cells from the follicle (Figure IV.).

Further from the centre there is a well marked vascular reaction. The capillaries are dilated and are filled with red blood corpuscles and lymphocytes. Sometimes extravasation of red blood corpuscles among the cells of the follicle may be observed. The periportal areas show much cellular accumulation of lymphocytes and some eosinophile cells which in some sections are quite numerous in this situation.

At Seventy Hours.

In the third day, at seventy hours, the follicle has become much larger and all the preceding changes are much more advanced. In the case of more than one parasite occupying the same liver lobule, an event which can only occur with very heavy experimental infestation, the follicle may be very large and irregular. Figure V. is taken from such a follicle. The cells of the follicle are of the same type, but there is an increase of the oval nucleated endothelial cell and a great increase in the number of eosinophile polymorpho-nuclear leucocytes. These cells are mainly aggregated around the periphery of the follicle and from this stage are a striking feature of the reaction which in this respect resembles that of other helminthic lesions.

At the end of the third day the parasite is usually completely hidden by the accumulation of cells, but a fortunate section (Figure V.) may show it. It has increased in size, but still shows the peculiar helminthic arrangement of its chromatin which stains deeply but irregularly and appears to be diffusing through the whole cell preparatory to the vesicular change. Giant cells are commonly seen and take the form of typical foreign body giant cells. They appear to be formed by the fusion of endothelial cells. There is a definite vascular reaction around the follicle and extravasation of red blood corpuscles is commonly seen. The liver cells show the same degenerative changes as before, but the changes appear now to be delimited to the three or four rows of cells immediately around the follicle. The cellular activity in the periportal zones is striking; there is an increase of all cells, especially the eosinophile cells and the condition is reminiscent of that found in early cases of bilharziosis of the liver as described elsewhere by the writer.[3]

At the End of Seven Days.

The follicle at the end of seven days is much larger. It is more definitely defined from the liver lobules than in the preceding stages (Figure VI.). The cells forming it consist of endothelial cells, eosinophile cells and lymphocytes with a great number of red blood corpuscles. The characteristic feature in the majority of follicles is the intense vascular reaction, capillary distension and diapedesis of red cells. In the macroscopic specimens small hæmorrhagic spots corresponding to the follicles can sometimes be seen. Even at this stage it appears as if in some cases the parasite becomes overwhelmed by the reaction of the host, the follicles appearing to be completely composed of leucocytes and red blood corpuscles. The presence in some of these of isolated chromatin of a peculiar



FIGURE V.

Edge of a follicle at the end of the third day, showing the parasite with its peculiarly arranged chromatin, giant cells, degeneration of liver cells and cellular reaction (ocular 3, objective 7; no reduction).

staining character suggests that fragmentation of the parasite has occurred. There is also a suggestive phagocytic giant cell reaction.

In the centre in the region of the parasite there is a more or less clear area composed of endothelial cells in a fibrinous background. Around this area is a zone of endothelial cells, lymphocytes, eosinophile cells, dilated capillaries and extravasated red blood corpuscles which tend even at this stage to arrange themselves in a concentric manner. Further out there is a zone of degenerated liver cells, sometimes with pyknotic nuclei and often fragmented and dissociated from one another. Liver cells may also be found scattered among the cells of the follicle itself. There is also here dilatation of the capillaries and evidence of cellular reaction (Figure VI.).

In the periportal zones there is a great accumulation of mononuclear and eosinophile cells. In these heavy experimental infestations a great accumulation of cells occurs in these areas and probably in later stages some degree of periportal cirrhosis would develope, of much the same type and degree as in infection of the liver with *Schistosomum mansoni*.

The parasite is often difficult to discover even with careful serial sections. It may, however, be seen in a fortunate section (Figure VII.). It appears to be about double its original size and the nuclear chromatin is collected around the periphery preparatory to vacuolation. The chromatin still retains its peculiar helminthic appearance and stains deeply with hæmatoxylin. The cytoplasm is more acidophile and stains well with eosin.

At the End of Fourteen Days.

By the end of fourteen days the parasite has become definitely vesicular and lies in a much larger follicle.

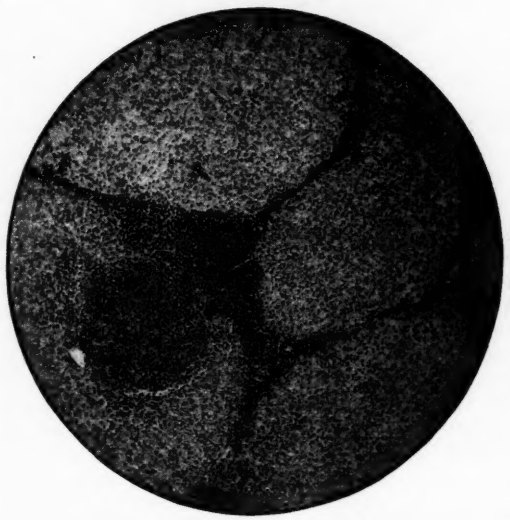


FIGURE VI.

Hydatid follicle at the end of the seventh day (ocular 2, objective 3; reduction, eight-ninths).

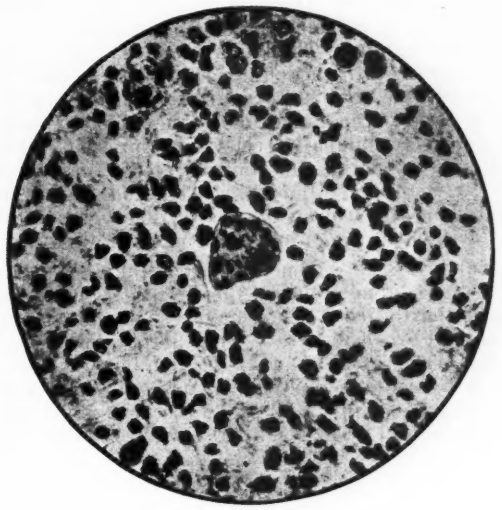


FIGURE VII.

Parasite in a follicle at the end of the seventh day, showing aggregation of nuclear chromatin at the periphery (ocular 1, objective 7; no reduction).

In typical follicles three zones may be made out. The change leading to vesiculation commences in the second week and, judging by the varying sizes of the resultant cysts at the end of the third week, the exact times varies greatly. The chromatin of the parasite becomes arranged into nuclear masses which are arranged peripherally in an acidophile cytoplasm (Figure VIII.).

The cytoplasm which is already showing traces of hyaline material, elaborates at the fourteenth day a fluid which accumulates in the centre of the parasite. The follicle is composed of the same cells as in the preceding stage, but the inner endothelial cells are commencing to arrange themselves in a radial manner; this will be seen in a much more advanced condition in the three weeks stage. The cellular reaction of eosinophile cells is evident both in the immediate neighbourhood of the parasite and in the periportal zones. The same zonal arrangement of the cells of the follicle as in the last stage, can be made out.

At the End of Three Weeks.

At the end of three weeks the hydatid follicle is easily visible to the naked eye and measures from 0.25 to 0.35 millimetre in diameter. The vesicular change has advanced rapidly and there is evidence of the formation of a laminated external membrane. The nuclear material is scattered irregularly over the layer and there is proportionately much more fluid present. Evident changes have occurred in the arrangement of the surrounding cells of the follicle (Figure IX.). Adjacent to the parasite the endothelial cells are arranged in a radial manner and comprise many giant cells apparently produced by the fusion of endothelial cells (Figure X.). There is a considerable infiltration with granular eosinophile cells, many of which have advanced even up to the parasite itself.

Around this zone there is a layer composed of fibroblastic cells which arrange themselves in a concentric manner. This layer is much thicker and there appears to be a definite effort on the part of the host tissue towards organization of the adventitious layer. Mononuclear cells, new blood vessels and many eosinophile cells are present. The vascular reaction is no longer intense nor is it characterized by capillary dilatation and diapedesis of red blood corpuscles, but has settled down to the organization of the outer layer of the follicle.

Around this is a zone in which the liver cells are in close apposition to the newly accumulated cells of the follicle. They may be dissociated and separated by leucocytes and fibroblastic cells. There is less evidence of toxic change in the hepatic cells, but some are apparently undergoing pressure atrophy. This must, in time, become more and more developed with the increased growth of the cyst.

the organization of the follicle wall is progressing and the wall is becoming more clearly marked off in layers. The laminated membrane of the cyst has developed and often during fixation reveals its elastic nature by curling up inside the cyst. The nuclear material which comprises the germinal layer of the hydatid cyst, is scattered irregularly in small masses on the inner aspect of this laminated membrane. The inner layer of the follicle is made up of radially arranged columns of endothelial cells with many giant cells. Between the columns can be seen very many eosinophile cells which are a characteristic feature of the tissue reaction. They may even be aggregated in direct contact with the laminated membrane of the parasite. Further out in the other layers of the follicle some little increase is seen in the process of organization in the form of concentrically arranged fibroblasts and new blood vessels (Figure XI.). As in the other stages the periportal cellular reaction is distinct. From

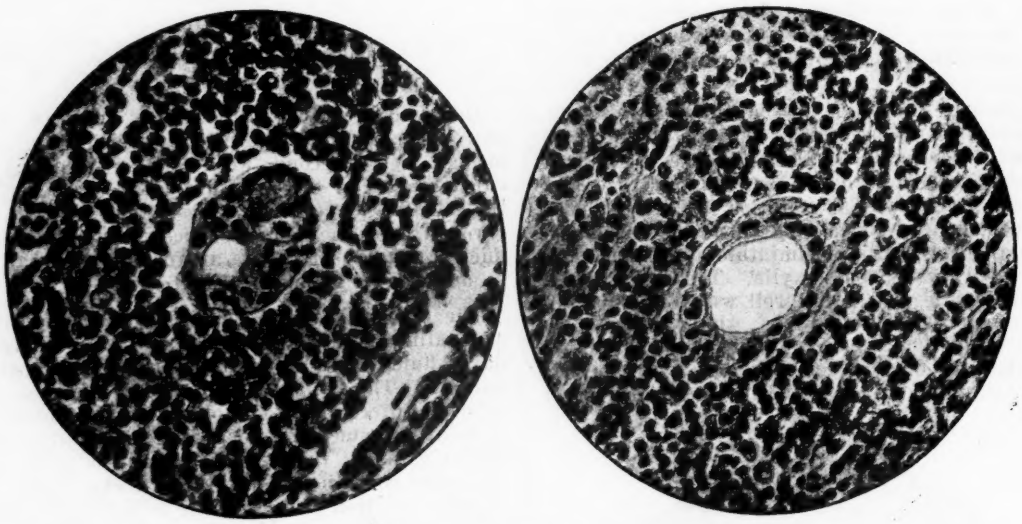


FIGURE VIII.
Showing vesiculation of the hydatid parasite at the fourteenth day (ocular 4, objective 7; no reduction).

The follicle by the twenty-first day occupies the greater part of a complete lobule of the liver and encroaches on the periportal zones. There is a great accumulation of cells in these zones, chiefly of eosinophile type and it is worthy of note that the bile ducts, even when they are actually involved in the follicular cells, present no change. Apparently they are extremely resistant to the action of the parasite toxin or to pressure.

At Four Weeks.

At the stage of development at four weeks but little further change can be noted. There is a great variation in the size of the follicles and cysts and it is very difficult in this set of experiments to detect any difference between many at this and at the previous stage. In the more advanced follicles this stage onwards the parasite grows steadily with the production of specific fluid and the elaboration of a laminated cuticle and tends to assume a spherical shape, although even in these early stages there is evidence that the line of least resistance may be followed, so that ovoid and even pouched cysts may be seen. In heavy infestations the aggregation of several parasites in one lobule leads to fusion of the follicular layers and varying types of cystic formation. The tissues of the host rapidly become organized with the formation of an adventitious cyst which encloses the parasite.

At Three Months.

The parasite at three months may be from forty to fifty millimetres in diameter. The laminated membrane is well developed and its characteristic

elasticity is manifest by the ready stripping up when the cyst is punctured and the fluid withdrawn or during fixation. This property is a peculiar one and in microscopical sections the membrane is usually found retracted from the adventitious layer. The germinal layer is still thin and contains nuclear material scattered diffusely through it. There is as yet no sign of any production of brood capsules. Immediately external to the laminated membrane is a layer of endothelial and giant cells which in the main are arranged radially. This layer, however, is relatively much narrower than in the earlier stages. Between the columns of endothelial cells there are many granular eosinophile cells which have a tendency to clump together in close contact with the laminated membrane. Outside the endothelial cells is a thick layer of fibroblastic cells, arranged concentrically and enclosing



FIGURE IX.

Hydatid follicle at the end of three weeks (ocular 2, objective 3; reduction, eight-ninths).

spaces which contain blood vessels and young tissue cells of all types. The adventitia has become much more fibrous in structure and the fibrosis is more plentiful at the periphery where the layer merges into the zone of compressed liver cells which are undergoing atrophy. The eosinophile reaction in the periportal zones has quietened down and the reaction of the tissues of the host is mainly a local one which endeavours to keep the organization of the adventitious capsule in pace with the growth of the parasite. At this stage several small cysts were observed in very close contact with the large hepatic vein leading into the inferior *vena cava* and one actually projected into the lumen of the vein. It is easy to imagine the rupture at a later stage of a cyst containing brood capsules and the subsequent carriage of hydatid emboli to various parts of the body.



FIGURE X.

Showing the inner zone of the follicle at the twenty-first day (ocular 2, objective 7; reduction, eight-ninths).

At the End of Five Months.

The cysts are much larger at the end of five months and may reach one hundred millimetres in diameter. The shape is usually spherical, but very often pouched cysts are seen. The pouching may be so extreme that a multilocular appearance is produced. The resistance of the biliary channels to the fibrosis in the adventitia is a characteristic feature of the later stages of the development of the cyst and patent bile ducts with perfect epithelium are often seen in the midst of the fibrous tissue of this layer. They act as points of resistance and by their presence appear to determine pouching

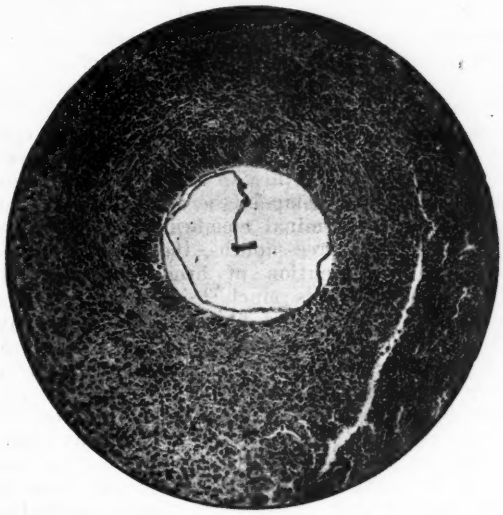


FIGURE XI.

Stage of cyst at one month (ocular 2, objective 3; reduction, eight-ninths).



FIGURE XII.

Section of the wall of the hydatid cyst at three months. Note the inner endothelial layer, the artificial separation of the laminated membrane and the organization of the concentrically arranged fibroblastic adventitia (ocular 2, objective 3; no reduction).

of the growing cysts. The fact that these channels are definitely resistant to the growth of the cyst no doubt explains the frequency of entry of bile into the cysts in a later stage and also of biliary drainage after the evacuation of an apparently simple liver hydatid cyst. The occasional passage of hydatid products *viâ* the biliary channels and the introduction of infection have a similar explanation. The laminated membrane is thicker and reveals its great elasticity by retracting as soon as the cyst is punctured or during fixation. It is laid down by the nucleated germinal membrane and, as the outer laminations are laid down first and the membrane is added to from the inside, the outer layers must be greatly stretched as the fluid of the cyst increases. When cut, therefore, these highly stretched layers retract and the cyst tends to turn inside out. This is very noticeable in older cysts, but can be seen even at five months. This inversion of the cyst may fulfil an important biological function, since it compels the spilling of the cyst contents. The germinal membrane is in the same condition as at three months, there being no indication of the formation of brood capsules. The adventitious layer is much thickened and to the naked eye is white and fibrous. The inner layer still contains a large number of endothelial cells and is infiltrated with leucocytes, many of which are eosinophile cells. As the cyst grows, this layer tends to undergo pressure necrosis, thins out and is converted into fibrous tissue. The remainder of the fibrous layer is less cellular, but contains some spaces enclosing small blood vessels and here and there patent bile ducts with intact epithelium. Further out the fibrous layer blends intimately with the surrounding liver cells and the perilobular fibrous tissue.

The liver cells in contact with the adventitia are pressed upon and undergo atrophy, the area which they occupied being replaced by fibrous tissue. In this peripheral zone the adventitia often comes into close contact with the larger sub-lobular veins. The intimate fusion of the adventitious coat with the liver tissue and the frequent close contact with large veins preclude the safe enucleation of the adventitious capsule with its contained hydatid cyst at operation. The cyst gradually enlarges by the accumulation of hydatid fluid and at a later stage begins to produce brood capsules. Its growth is a continuous process and there appears to be no limit to the size to which it may attain.

In the pig the peculiarly abundant perilobular fibrous tissue may have a restraining influence on the cyst growth. In many cases the resistance of large, thick walled blood vessels and of the biliary channels causes pouching, but this is a purely mechanical process due to growth along the paths of least resistance rather than a true continued budding. Many varied appearances are thus produced.

Multilocular cysts are often produced in this way and occasionally the partial fusion of adjacent cysts may give a peculiar appearance. Nothing, however, approaching the complexity of arrangement of the hydatid parasite resembling that of the *Echinococcus alveolaris*, has been found.

Retrogression of the Cyst.

In the later stages, namely from three to five months, of this set of experiments one could not help being struck by the evidence of retrogression of many of the cysts. Probably this is a more frequent occurrence than is usually believed.

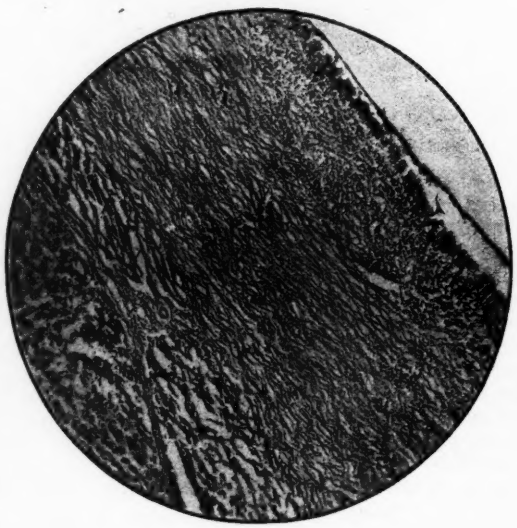


FIGURE XIII.

Section of the wall of a cyst at five months, showing the adventitious layer (ocular 4, objective 3; reduction five-sevenths).

In one set of sections (three months) the laminated membrane had separated from the endothelial layer and there was an accumulation of eosinophile cells between it and the endothelial layer of the adventitia (Figure XIV.). The membrane appeared to be undergoing fragmentation and the eosinophile cells had actually invaded it. The appearances suggested phagocytosis of the membrane by the eosinophile cells. The inner portion of the adventitious layer showed the development of very large giant cells (Figure XV.) of a peculiar type with large pseudopodia, a finding which strengthens the belief that the cellular reaction of the host may at times overcome the parasite by phagocytosis, absorption and fibrosis.

In the fifth month retrogressive changes were even more marked and in some cases there had been absorption of the hydatid fluid, destruction of the hyaline laminated membrane and great thickening of the adventitia. The thickened adventitia had then somewhat irregularly contracted on the collapsed cyst giving rise to a wrinkled thick-walled fibrotic sac enclosed in an area of dense fibrosis. In this way a peculiar multiloculated appearance may be produced or the cyst may be entirely replaced by a fibrous nodule. The deposition of calcium salts is not uncommon.

SUMMARY.

This short experimental study of the early stages of the development of the hydatid cyst leads to the following conclusions:

1. The hydatid hexacanth embryo finds its way to the liver by means of the portal vein and there is evidence to show that the liver barrier is by no means a perfect one.



FIGURE XIV.

Section of the wall of a cyst at three months, showing separation of laminated membrane and accumulation of eosinophile cells between it and the adventitia (ocular 2, objective 3; reduction, eight-ninths).

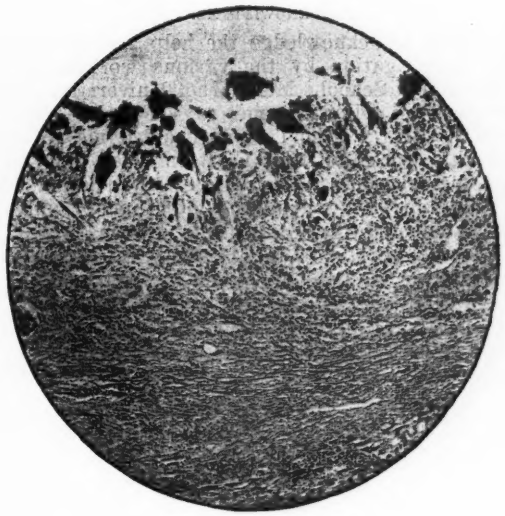


FIGURE XV.

Section of the wall of a retrogressing cyst at three months, showing peculiar large type of giant cells arranged in the inner layer (ocular 2, objective 3; reduction, eight-ninths).

2. The time taken for the embryo to reach the liver is very short and sections show it in the liver lobules within twelve hours.

3. The embryo tends to come to rest in the substance of the liver lobules and has a predilection for the sub-peritoneal lobules.

4. By the local reaction of the liver tissue a hydatid follicle is rapidly produced. In the second week vesiculation commences.

5. There is a very striking local eosinophile cellular accumulation and also much cellular reaction in the periportal zone which brings this infestation into line with that of other helminths.

6. There is evidence that in some cases the cellular reaction on the part of the host tissue overcomes the parasite in the earlier stages with the production of an aborted follicle.

7. The adventitious capsule by organization becomes avascular and fuses intimately with the surrounding liver tissues. This fusion precludes any possibility of total enucleation of the whole cyst at operation.

8. A remarkable feature is the persistency of patent biliary channels in the fibrous adventitia even close up to the parasite itself. This no doubt explains the frequency of complications in liver cysts due to the entry of bile and so forth.

9. The cyst grows as a rule in a spherical form, but it also tends to take the line of least resistance, so that pouching is not uncommon. This pouching is determined by the local resistance of bands of fibrous tissue, large blood vessels or bile ducts.

10. At the end of five months the cyst may reach a diameter of one hundred millimetres, but there is no trace of the formation of brood capsules at this stage.

ACKNOWLEDGMENTS.

I wish to acknowledge the help accorded me in this investigation by the various workers at the Veterinary School, Melbourne University, whose courtesy in allowing me to keep the requisite animals at the school alone enabled me to carry out this work; to Mrs. E. Barnes for her skilful histological work and to Miss C. Maudsley and Mr. H. Marriott for the micro-photographs I am also much indebted.

REFERENCES.

(1) Leuchart: *"Die Parasiten der Menschen,"* Leipzig, 1886.
(2) Dévé: *Archives de Medécine Experimental et d'Anatomie Pathologique*, May, 1916.
(3) *Journal of Pathology and Bacteriology*, 1923, Volume XXVI., page 27.

Reports of Cases.

PUERPERAL HÆMATOMA.

By P. L. HIPSLEY, M.D., Ch.M. (Sydney),
Honorary Surgeon, Royal Alexandra Hospital for Children, Camperdown; Honorary Assistant Surgeon, Royal Hospital for Women, Paddington, Sydney.

THE following case is interesting on account of the rarity of the condition.

A.L., aged thirty-one years, a *multipara*, was delivered of a healthy infant on September 10, 1924. The labour was spontaneous, chloroform was administered for a few minutes, as the head was born and the placenta came away without any difficulty.

On the morning of the third day the patient complained of severe abdominal pain. Her temperature had been normal since the confinement. The lochia was quite normal. The cervix was healthy, but there had been a slight laceration of the perineum. The patient looked very pale and ill and had a rapid pulse. A large mass could be felt in the right iliac region, pushing the uterus over to the left. The abdomen was greatly distended due apparently to intestinal obstruction. An enema was returned clear. The patient vomited after a dose of castor oil.

The patient was seen in consultation with Dr. P. N. Aiken, of Kensington, and after removal to the Royal Hospital, Paddington, Dr. Constance D'Arcy saw her and agreed that operation was indicated.

Treatment.

Laparotomy revealed a very large retro-peritoneal hæmatoma, which had separated the layers of the broad ligament to their fullest extent and had dissected its way retro-peritoneally up to the right kidney and between the layers of the mesentery and mesocolon. As the bleeding was still going on, I made an incision through the anterior layer near the upper border of the broad ligament and rapidly cleared out as much of the blood clot as possible. Iodoform gauze was then packed into the cavity left after removing the clot, but it proved difficult to control the hæmorrhage in this way. About three hundred cubic centimetres of blood from the husband was given by transfusion after the operation, but in spite of this the patient died soon after the transfusion.

Comment.

Seeing that there was no interference whatever during the confinement, the cause of the hæmorrhage is difficult to ascertain.

Whitridge Williams states that immense quantities of blood may be effused beneath the peritoneum in these cases and in thirty-three cases collected by him in 1904 the mortality was 56% and in 71% the hæmorrhage was after spontaneous labour.

Reference.

J. Whitridge Williams: "Obstetrics," 1910, page 903.

TUMOUR OF THE THYMUS GLAND.

By ERNEST SUTTON, M.B., B.S.,
Melbourne.

ON Tuesday, June 24, 1924, Y.B., a female, aged three years, commenced vomiting. The attack was mild and on the following Thursday and Friday she was better and played about the house. On Saturday morning at 2 a.m. she awakened her mother, pointed to her stomach and said: "It hurt." She became pale, almost pulseless and died gasping in an hour.

On Friday, June 27, 1924, the day before, her brother, T.B., aged one year and eight months, also had a mild attack of vomiting similar to his sister. Next day, Saturday, at noon he became listless and pale with an almost imperceptible pulse and died in a convulsion at 4 p.m..

Eight years ago another brother, aged seven and a half months, died in the same way after a gastric attack.

Five years ago still another brother, aged one year and ten months, died in the same tragic manner.

Each parent gave up all hope as soon as the brother, T.B., became ill, so similar they said were the symptoms to the other fatal cases.

A *post mortem* examination was allowed on the boy T.B.. A large thymus gland was found extending from the neck behind the sternum and covering the heart completely except for the apex. The spleen was slightly enlarged and a small mass of splenic substance, about the size of a walnut, was found adjacent.

An X-ray examination of the surviving children, a girl of eight or nine years and a baby boy, three months old, was made at the Children's Hospital. Nothing abnormal was found in the girl, but a shadow was shown behind the sternum in the boy. This boy is delicate, always ailing with bowel and stomach complaint, but the girl never requires any medical treatment and, though small, is healthy.

All the children were bright and intelligent, but physically weak, under-sized and pale.

The inference is that four, probably five out of six children had enlarged thymus glands.

CASE OF HYDATID INFECTION INVOLVING THE MYOCARDIUM.

By NEIL E. GOLDSWORTHY, M.B., Ch.M. (Sydney),
Sydney.

History and Physical Examination.

M.S., a female, *ætatis* forty-three years, was admitted to Sydney Hospital on July 23, 1921; complaining of swelling of the right side of the neck, a sensation of pressure on the wind-pipe, fainting attacks and enlargement of the veins of the neck for the past three years. The patient traced her trouble back to the extraction of some teeth, when her face, neck and right arm swelled up, necessitating treatment in the hospital; after three months the symptoms disappeared. For about fifteen months there seems to have been no further serious manifestations of disease until February, 1920, when the patient "collapsed" in bed and was again in hospital for thirteen weeks. During the year her condition had been characterized by frequent "fainting turns," choking sensation on exertion and gradual enlargement of the superficial veins of the thorax and the upper part of the abdomen. There had also been pain in the right side of the neck for six months.

The family history is clear.

Her personal history reveals the fact that the patient lived in the country until ten years ago. Her previous illnesses include three attacks of "pleurisy" during the past five years. Physical examination showed the woman to be well nourished and in no apparent distress. There was definite enlargement of the veins of the right side of the neck, thorax and upper part of the abdomen. Apart from some dulness to the right of the *manubrium sterni*, the lungs seemed to be normal. There was a mitral systolic murmur and a pulse rate of 90, while the lower border of the liver was palpable below the costal region.

During her stay in the Sydney Hospital the patient complained of a tingling sensation in her arm and fingers (? right) and pain in the right shoulder and arm. The X-ray report on July 24, 1921, was as follows: "Enormous heart shadow and enlarged mediastinal glands."

The patient was discharged on September 3, 1921.

Examination on October 21, 1921, revealed a much stronger pulse on the right side.

About thirteen months after her discharge from the Sydney Hospital she was re-admitted on October 26, 1922, the chief complaint being cough for three months, while the previously mentioned symptoms appear to have been at this time much less severe. Physical examination resulted in findings very similar to those given above, with the addition of some signs of consolidation at the base of the right lung. The heart, however, seemed appreciably altered, the apex beat now appearing in the sixth intercostal space.

Two days after admission the patient was cyanosed and breathless with extending dulness on the right side and elevated temperature. From this time onward she gradually became worse, with œdema of the limbs and trunk daily extending, until death occurred on November 27, 1922, with symptoms of acute myocardial insufficiency. During the illness the temperature, pulse and respiration were very irregular. An X-ray report on November 11, 1922, was to the following effect: "Mediastinal tumour filling the lower half of posterior mediastinum."

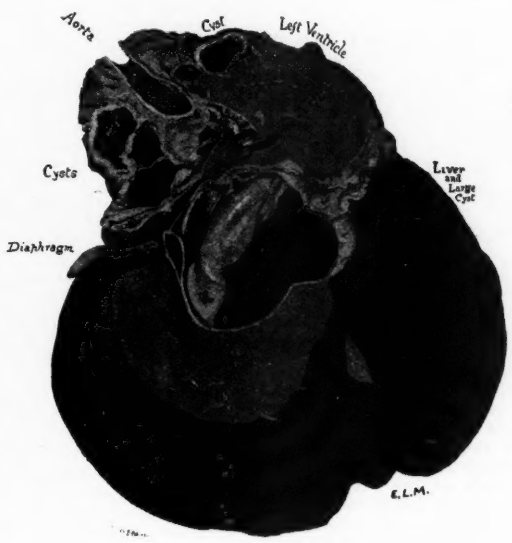


FIGURE I.

Post Mortem Examination.

The heart appeared to extend far to the right and left beyond its normal limits. There was much clear fluid in both pleural cavities as well as adhesions; both features were more evident on the right side. The right lung appeared to be fibrous, as though in a state of chronic collapse, while the left lung was very congested and œdematous. The pericardium was firmly adherent to the heart, whose apex was displaced outwards towards the axilla. The liver, diaphragm and heart were removed in one piece for future examination (see Figure I.), during which process a large cyst was accidentally opened in the upper part of the mediastinum. This discharged white ectocystic material and pus-like fluid. Another cyst was palpable in the upper portion of the wall of the left ventricles and one towards the lower part of the ventricles. There was a little fluid in the peritoneal sac and adhesions to a mid-line scar in the hypogastrium, whilst her spleen and kidneys were congested.

In the upper portion of the liver was a large cyst ten to twelve centimetres in diameter, lined by thick ectocyst-bearing endocyst densely studded with brood capsules containing numerous scolices. There was no apparent communication between this cyst and those in the thorax. Of the latter there were two main groups, one in the wall of the left ventricle (above and to the left) and the other occupying the region near the right atrium and lower posterior segment of the mediastinum. This group gave the impression of having coalesced to form one or two irregular cavities, the individuality of the cysts and their membranes being destroyed by suppuration. Situated in the myocardium posteriorly were two cysts, one shrunken and degenerate, about two centimetres in diameter and one about four centimetres in diameter. The single cyst on the left was three to four centimetres in diameter and was very definitely within the muscle wall of the heart, since the pericardium was capable of separation from the myocardium at this point and left the cyst wall intact. Only a few millimetres of muscle intervened between the cavity of the cyst and the cavity of the left ventricle.

The right pulmonary artery and the right bronchus lay between the mediastinal cysts anteriorly and the bodies of the vertebræ posteriorly; this may have caused partial obstruction to both these canals, for the suppurating contents of the cysts were under considerable pressure. Unfortunately the brain was not examined.

Discussion.

Owing to the length of this report and to the fact that it is intended to show the specimen, comment is limited to the suggestion of a few problems arising from the case. The actual cause of death was toxic absorption or mechanical embarrassment of the adherent pericardium.

The cause of the collapse of the right lung was pressure on the bronchus and artery or chronic bacterial infection.

Acknowledgments.

I wish to thank Dr. F. W. Hall for permission to report the case and Dr. E. L. Murphy for his excellent drawing of the specimen, which is of immense aid in understanding the situation of the main cysts.

Reference.

A. V. M. Anderson and S. W. Patterson: "Hydatid of the Heart and Hydatid Emboli," "Transactions of the Australasian Medical Congress (British Medical Association), Melbourne, 1923," Supplement to THE MEDICAL JOURNAL OF AUSTRALIA, February 23, 1924.

Reviews.

THE KNEE JOINT.

THE knee joint is disabled more often than any other joint in the body. Frequently the disorder is produced by an apparently trivial injury. It is very apt to recur and in the absence of a correct understanding of the pathology and treatment of the lesion, the time of recovery is unduly prolonged, to the great annoyance of the patient and the discomfiture of the medical attendant.

Mr. Timbrell Fisher in "Internal Derangements of the Knee Joint" offers a solution of many of the problems arising in connexion with this disability[1] and it is a

[1] "Integral Derangements of the Knee-Joint," by A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.); 1924. London: H. K. Lewis an Company, Limited; Demy 8vo., pp. 156, with 40 plates including 80 figures. Price: 12s. 6d. net.

pleasure to be able to recommend to the general practitioner and surgeon a work which contains so much valuable information.

In this monograph the structure and function of the normal knee joint are fully described, the peculiar mechanical arrangement and its bearing upon the causation and symptomatology of derangement are clearly explained and an excellent description is given of treatment by mechanical methods, by physio-therapy and manipulation and by operation.

The larger part of the book deals with the semilunar cartilages, but a study is also made of loose bodies, arthritis and the more severe forms of derangement.

The foreword has been written by Sir Arthur Keith, the pathological investigations were carried out under the eye of the late Professor Shattock and throughout the text pithy and illuminating notes have been made by Sir Robert Jones.

The book is worthy of its distinguished sponsors and should be read by everyone whose practice brings them into touch with the disabled knee joint.

HYGIENE FOR NURSES.

THE second edition of Dr. Rutherford Darling's Elementary Hygiene for Nurses" has made its appearance and should receive a warm welcome.[1] Its scope is limited to some extent by the syllabus for the final examination of the Australasian Trained Nurses' Association, but within the short space of two hundred and thirty pages Dr. Darling has set out a great deal of valuable information, in a form which is succinct as well as interesting.

Chapter I. deals largely with ventilation and temperature, aspects of the health problem which are of especial interest to inhabitants of a warm country such as Australia.

Chapter II., dealing with food and milk, is one the best in the book. Some general observations on dietetics are made and then comes an excellent little section dealing with the modern views on vitamins, the letterpress being supplemented by appropriate illustrations.

A portion of this chapter which should prove of value to members of the medical profession as well as to nurses, is that devoted to the cooking of food. We are apt to lose sight of the different results achieved by different methods and there is point in the reminder that the reason we add caper sauce to boiled mutton is that the process of boiling removes so much of the soluble constituents of meat (extractives) that it becomes insipid, hence the need for the savoury addition. The milk problem is efficiently handled, the precautions for keeping this most important article of diet clean and the necessity for such great care being clearly set out.

The chapters on sanitation and sewage contain much practical information which applies not only to our cities and larger towns, but also to the more isolated portions of Australia.

From the nursing aspect, Chapter V., on the prevention of infectious diseases, is highly instructive and in connexion with all the common infectious fevers, details are given as to the means of checking the spread. Brief mention is made of the Schick test in connexion with diphtheria. The chapter finishes up with a thoroughly practical description of the disinfection of a sick room.

Parasites and insects are dealt with briefly, the life history and symptoms being discussed in the case of the common examples.

The final chapter is a common-sense exposition of the principles of personal hygiene; on reading it we wonder by how much the average physical standard of the nation would be raised could the prinicples thus set forth be enforced.

A specially useful section is the appendix containing information as to weights and measures, the onset and incubation period of the infective diseases and various household applications.

The small volume is admirably produced, while the printing, illustrations and diagrams are in keeping with the excellence of the subject matter. There is every reason for the hope of the author as expressd in the preface that, as well as being of some assistance to nurses, the work may also prove useful to students and junior members of the medical profession.

OBSTETRICAL NURSING.

THE second edition of "Obstetrical Nursing" by Dr. Charles Sumner Bacon cannot in Australia be regarded as a text-book for nurses.[1] A nurse sitting for the examination of the Australasian Trained Nurses' Association is required to know much more about the diagnosis and treatment of complications. An Australasian "bush nurse" is often called upon to act on her own responsibility in some emergency complication. It is written for the nurse in private employment, when the patient is well off financially, when there is a doctor in attendance and the nurse has no responsibility whatever. The description of the actual nursing is excellent, but it would teach the nurse little about the art of obstetrics. She would not be able to take over the management of a labour if the source of her knowledge were restricted to this book.

There are six chapters. The first, on a nurse's duties, is advice that is much needed by obstetric nurses. The chapter on anatomy and physiology is plainly written, but no diameters of the pelvis are given. Embryology is beyond the comprehension of the usual obstetric nurse. The neurotic element of *hyperemesis gravidarum* is well explained. The statement that a nurse "should perfect herself in the technic of administration of anæsthetics" is truly American.

In the treatment of *post partum* hæmorrhage a vaginal douche at 49° C. (120° F.) is recommended. Exception may be taken to this advice. No mention is made of bimanual compression of the uterus. The subject of "puerperal fever" requires much more detail than the author gives to it.

The chapter on the infant is instructive to the doctor, the student and the nurse. The care of the infant is quite as important as that of the mother and in her eyes more so, yet the infant is so often neglected.

Some of the illustrations are particularly good.

Although some classifications would not be accepted in Australia, there is much in the book that is valuable both for students and nurses.

STERILITY.

THE subject of fertility and sterility in human marriages is one which interests alike the general practitioner and gynæcologist. The appearance of a book on this subject by Dr. E. Reynolds and Dr. D. Macomber will therefore be welcomed by a large section of the profession.[2]

The subject is opened by a presentation of the biological aspect of the problem and an attempt is made to arrive at some conclusion as to the index of voluntary sterility in civilized peoples. The authors give it as 10%, but admit that an exact figure cannot be given on the evidence.

An account of the physiology and mechanism of reproduction and its failures is given with clearness. The operative procedures for the remedy of defects are enumerated and described.

[1] "Elementary Hygiene for Nurses: A Hand-Book for Nurses and Others," by H. C. Rutherford Darling, M.D., M.S. (London), F.R.C.S. (Eng.), F.R.F.P.S. (Glasgow); Second Edition; 1924. London: J. and A. Churchill. Crown 8vo., pp. 230 + viii., with 45 illustrations. Price: 5s. 6d. net.

[1] "Obstetrical Nursing," by Charles Sumner Bacon, Ph.D., M.D.; Second Edition, thoroughly revised; 1924. Philadelphia and New York: Lea and Febiger. Post 8vo., pp. 340, with 126 illustrations. Price: $2.75.

[2] "Fertility and Sterility in Human Marriages," by Edward Reynolds, M.D., and Donald Mccomber, M.D., with a Section on "The Determining Causes of Male Sterility," by Edward L. Young, Jr., M.D.; 1924. Philadelphia and London: W. B. Saunders Company; Melbourne: James Little. Royal 8vo., pp. 285, illustrated. Price: 25s.

Causes of failure in the "mechanism of fertility" are shown to be both bio-chemical and mechanical. Increased acidity of the vaginal secretion is chemically hostile to the spermatozoa; a tenacious mucus in the cervical canal may obstruct the passage. A very acid vaginal secretion with ovarian abnormality appears at times to be remedied by treatment of the latter condition.

The importance of passive congestion in causing bio-chemical hostility is emphasized in specific and in non-specific infections. Passive congestion quite apart from any infective condition is regarded as a potent cause of sterility.

Acute anteflexion is considered as a partial failure of development and an operation is described which is stated to be of permanent value for straightening the canal, namely section of Goffe's ligament, in addition to the usual dilatation.

It is later advised that in the presence of a short anterior vaginal wall no suspensory uterine operation should be undertaken without releasing this ligament. This it is claimed will prevent the uncomfortable results sometimes found after suspensory operations.

The section on the determining causes of sterility in the male includes an account of the physiology of the tract. The various abnormalities and infections are mentioned and their treatment suggested.

The nervous aspect of the picture is just indicated. Its importance is so well realized nowadays that this may be all that is needed.

The subject of relative infertility affords much food for thought; the carefully plannel animal experiments which form a basis for conclusions throughout this book, are pertinent and instructive.

Habitual miscarriage is common. The conclusion is reached that it is often due to inherent defect in the fœtus, the sperm cell being responsible in some 20% of the cases. This and other considerations should help in the treatment of these unsatisfactory patients.

A chapter on diet is interesting and suggestive. Its contents provide a strong argument for the teaching of dietary laws to the general public.

One child sterility is another aspect of the question and the damage wrought by infection during labour is shown to be a factor in many cases, owing to sealing of the tubes and changes in the bio-chemical reactions. Methods for the remedy of this condition are given, such as the operation of insufflation described first by Rodin in 1920. The danger of lighting up infections of the peritoneal cavity or tubes by this procedure is rightly emphasized and the circumstances justifying its use, are discussed.

A chapter on the marital habit contains information which the young practitioner will find most useful; the same applies to that on the management of puberty and menstruation.

The suggested clinical examination of the patient can be said to be almost alarming in its thoroughness. It is certainly more than every patient will permit. It is well, however, that the profession should recognize the complexity of the subject, the need for an investigation which is not confined to one partner and the type of examination which gives the required information.

We agree most heartily with the remark that surgery is quite unjustifiable for sterility alone, when adequate examination has not been made of both individuals concerned.

The book as a whole is well written, in large type and is easy to read. The use of the word "atresia" for "atrepsia" as a failure of development, seems to be a printer's error. Altogether a book well worth while.

INFECTION, IMMUNITY AND DISEASE.

MR. J. E. R. MCDONAGH has recently produced a beautifully illustrated volume entitled "The Nature of Disease," in which he records the results of his researches and the views to which they have led him.[1] He proposes to embody the results of future work in further volumes. The title of the book seems at first glance to be somewhat ambitious, but the author points out that the intensive study of one disease, such as syphilis, is tantamount to the study of the whole of medicine.

Starting from his work on the life history of the spirochæte of syphilis which, by the way, has not yet claimed the acceptance of protozoologists, he discusses the rationale of staining and the reaction of leucocytes and of epithelial, endothelial and connective tissue cells to irritation. The greater part of the book is concerned with an attempt to explain the phenomena of infection, immunity, hypersensitiveness and the action of drugs and organ extracts in terms of the modern electronic conceptions of physical chemistry. We doubt whether there are as yet sufficient data to permit of such a treatment of the subject matter of immunology and while there is much in McDonagh's views that is highly suggestive, his theories are open to the criticism that they do not take account of many well established experimental facts.

The book is emphatically not one which can be read with benefit by the ordinary physician and it would require the services of half a dozen specialists in different departments of scientific knowledge to assess its value.

[1] "The Nature of Disease," by J. E. R. McDonagh, F.R.C.S., Part I.; 1924. London: William Heinemann (Medical Books) Limited. Crown 4to., pp. 327, with illustrations. Price: 63s. net.

BIRTH CONTROL.

DR. MARIE C. STOPES who is a doctor of science and of philosophy and not a medical graduate, is well known as an advocate of the practice of contraception. In the volume under review which is said to be a manual for the medical and legal professions, she has dealt at length with the theories, history and practice of birth control.[1] Introductory notes of a laudatory nature are contributed by the late William Bayliss, Sir James Barr, Dr. C. Rolleston and others.

Much controversy has taken place concerning the doctrines enunciated by Dr. Stopes and much opposition has been shown to her views. In this book she discusses at length the various objections that have been raised to contraception, these objections being classed as pseudo-scientific, national, legal, ethical and religious. The last named will appear to many to be of much importance and in this connexion the authoress quotes Dean Inge who in 1922 stated: "If the birth rate were maintained at anything like its natural level—about forty—all over the world, the population of the globe which is now 1,700 millions, would in one hundred and twenty years have reached 27,000 millions or about ten times as great a number as the earth could probably support. This it seems to me is the fundamental fact we have to recognize and one which makes a drastic limitation of the birth rate an absolute necessity."

From a medical point of view there can be little doubt that there are cases in which the prevention of child-bearing in married women is called for and in which it would be difficult and indeed undesirable to attain this object without the use of one of the methods here described. The simplicity of that advised by Dr. Stopes and its probable efficacy commend its adoption when medical opinion is in favour of the avoidance of pregnancy. If, as Dr. Stopes believes, the adoption of such a method would prevent the frequent production of abortion, very considerable benefit would ensue to the health of women.

From the broader point of view it would be well for the nation if birth control could be so regulated as to insure the advancement of the race. If that could be done, contraception might be of much value. It seems probable, however, that these methods would be availed of rather by those whose children would be fittest to survive, so that on the whole little advantage would accrue if the information contained in this book were widely disseminated.

Dr. Stopes favours instruction in medical schools on the matters dealt with by her, but the methods she describes, are likely to become more generally known as

[1] "Contraception (Birth Control): Its Theory, History and Practice," by Marie Carmichael Stopes; with an Introduction by Professor Sir William Bayliss, M.A., D.Sc., F.R.S., and Introductory Notes by Sir James Barr, M.D., LL.D., F.R.C.P., Dr. C. Rolleston, Dr. Jane Hawthorne and "Obscurus"; 1923. London: John Bale, Sons and Danielsson, Limited. Demy 8vo., pp. xxiv. + 416, with illustrations. Price: 12s. 6d. net.

the result of her writings and it seems unnecessary to add another subject to the already over-burdened curriculum.

The establishment of birth control clinics is referred to at some length and in some countries, Holland especially, many such clinics have been established. Attempts to found such institutions in America were stopped by the police authorities. Dr. Stopes suggests that any information concerning contraception should be made available in ante-natal and infant welfare clinics and this would be free from objection if such clinics were controlled and staffed by medical men and women possessing a proper appreciation of the difficulties and dangers associated with the subject.

Varying opinions will naturally be held by medical men and others as to the necessity and frequency of use of the methods advocated by Dr. Stopes. There can be no doubt, however, as to her sincerity of purpose and the labour involved in the compilation of the book. It contains much information not procurable in any other volume and may be recommended for perusal by members of the medical profession. The broadcasting of such information to the general public would, however, certainly be undesirable and would be likely to do much more harm than good.

PHYSICAL EXAMINATION OF THE CHEST.

THAT there have been three editions closely followed by the same number of reprints is sufficient proof of the popularity and demand for the "Principles of Physical Diagnosis in Diseases of the Chest" conjointly written by Professor Norris, of the University of Pennsylvania, and Dr. H. R. Landis, Director of the Phipps Tuberculosis Institute, Philadelphia.

The first seven chapters devoted to physical diagnosis include the theory and different methods of percussion. There is an excellent chapter on acoustics in physical diagnosis which might well be imitated by English writers on diagnosis. In this connexion the classical experiments made by Bondet and Chauveau on the hepatized lung of the horse which by the way have never been contradicted, are not even mentioned.

We are glad to note that in the chapter on palpation the zones of cutaneous hyperæsthesia commonly known as Head's areas, are frequently quoted and the referred cardiac pain of Mackenzie, showing the area of pain met with in *angina pectoris*, is also mentioned.

Chapters VIII. to XI. inclusive comprise the consideration of auscultation and the very best in this division is Chapter IX. Here a very instructive account of the normal breath sounds is given along with the abnormal modifications of the respiratory murmur. Following this there is a good paragraph entitled "Extraneous Sounds," on page 112. Here Professor Norris calls attention to the sound produced by contracting muscle which is often mistaken for a râle. There are other sounds which are misleading, for example when the patient swallows during auscultation a sound like a râle may be heard and this is most noticeable when the patient coughs and takes a long breath. As this is a very excellent method of eliciting latent râles, the observer ought to notice that the patient does not swallow during the examination. In auscultating the apices great care ought to be taken not to confuse the fine creaking naturally produced in neighbouring joints for pulmonary râles. These fictitious sounds can be easily identified by manipulating the neighbouring articulations. Professor Norris rightly draws attention to the fact that the transmission of sounds from the diseased to the healthy side may occur and points out that this mistake may be avoided by tracing the sounds from their point of maximum intensity away from that point.

The difficult subject of the differential diagnosis of râles from fine pleuritic friction—a subject very puzzling to the novice—is fully discussed in Chapter X..

Part II. of this interesting work is devoted to the examination of the circulatory system. Practically the same procedure is maintained as in the discussion of lung examination, auscultation and percussion being first considered, followed by a very readable chapter on instrumental methods. Chapter XVI. gives a description of the electro-cardiographs and its uses by Dr. E. P. Krumbhaar.

The effort syndrome is very ably discussed at page 192 and all those interested in the irritable heart of soldiers—the "D.A.H." of the Great War—will read this with great profit; in fact the whole chapter on cardiac arrhythmia may be studied with advantage.

Part III. which comprises the greater part of the book, is concerned with disease of the lungs and pleura.

Nothing but praise can be given to every section. Perhaps the most readable is that allotted to pneumonia. Here the four pneumococcal types are handled in a very masterly manner. The most important outcome of this discussion naturally relates to treatment, but as this work is only confined to diagnosis, this is not considered. Great emphasis we think is rightly placed on the determination of the infective organism and the fact that the essential character of the infective agent in pneumonia is more significant than the location or even the type of the consolidation.

In the consideration of pulmonary tuberculosis we are pleased to notice that attention is given to abortive tuberculosis and also to masked tuberculosis both of which have not been fully studied by many of the profession.

The rarer forms of pulmonary disease have been carefully described and thus form here a convenient nucleus for reference.

In Part IV. diseases of the heart are treated in a scholarly manner. In our opinion the sections read with the greatest profit are those on endocarditis and *angina pectoris*. In the consideration of the latter Clifford Allbutt comes in for well deserved notice.

Summing up this work as a whole, the general tone reflects the greatest credit on the authors, there is not a trace of "padding" from cover to cover and every word of it may be read with interest either by consulting physicians or by those who are on the staff of any teaching hospital.

[1] "Diseases of the Chest and the Principles of Physical Diagnosis," by George William Norris, A.B., M.D., and Henry R. M. Landis, A.B., M.D., with a Chapter on "The Electrocardiograph in Heart Disease," by Edward B. Krumbhaar, Ph.D., M.D.; Third Edition, Revised; 1924. Philadelphia and London: W. B. Saunders Company; Melbourne: James Little. Royal 8vo., pp. 907, with 434 illustrations. Price: $9.50 net.

THE FOOD OF CHILDREN.

WE have read Dr. L. Emmett Holt's little book on food, health and growth with pleasure and approval. It is a discussion of the nutrition of children and comprises a series of five lectures on the subject that were delivered at the Leland Stanford Junior University in 1921. The language is direct, simple and easy to read.[1] The matter is carefully considered and Dr. Holt's conclusions and advice are wise and helpful. It is hardly necessary to say that Dr. Holt knows his subject and everything all round his subject. In this book, the question is not the food and health of babies under one year, but the nutrition of children from babyhood to full adult development.

Dr. Holt has been seriously perturbed by the revelations provided during the war, when something like 30% of the young men drafted for the United States army, were rejected as physically unfit for service. He has devoted a great deal of study to the prevention of this state of things. In these lectures he considers the causes and he proposes methods which, if carried out, would certainly prove of great value to the health and general fitness of the people. One after another, he takes the various elements of a diet and considers the quantity and the proportions required at different ages. He begins, naturally, with the caloric requirements and then considers protein quantitatively and qualitatively; then fat, carbo-hydrate and mineral salts. A whole lecture is devoted to the vitamins.

In his final lecture he discusses the means of bringing about a better state of things. He proposes to do this by teaching the children in the schools, so that when they grow up they will know better and do better than their parents. We endorse this view.

This little book would be very helpful to intelligent parents, teachers, house-providers and medical men who have to advise about children.

[1] "Food, Health and Growth: A Discussion of the Nutrition of Children," by L. Emmett Holt, M.D., LL.D.; 1922. New York: The Macmillan Company; Sydney: Angus and Robertson, Limited. Crown 8vo., pp. 273. Price: 7s. 6d.

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A Retrospect.

Physiology.

As in 1923 more work has been carried out in 1924 with "Insulin" and the problems which its use reveals, than with any other subject connected with physiology. The mode of action of the pancreatic hormone is becoming clearer, as is its importance in regard to the carbo-hydrate metabolism in the body. Olmstead and Logan have shown that the medulla is necessary for the production of convulsions following the administration of "Insulin." When "Insulin" was administered to decapitated cats, the blood sugar content fell to a very low level, but no convulsions were observed. In cerebrate animals, on the other hand, typical convulsions were produced. Cannon, McIvor and Bliss have produced evidence to indicate that the pallor, rapid pulse, dilatation of the pupils and profuse sweating which follow excessive doses of "Insulin," are due to adrenalin discharge. The increased cardiac rate is not noted when the supra-renal bodies are removed before the injection of "Insulin." Further the discharge of adrenalin at a certain point in the fall of the glucose percentage in the blood checks this fall to a large extent. Bulatao and Carlson believe that the concentration of sugar in the blood has an important relation to gastric hunger contractions. Hyperglycæmia induced by intravenous injections of glucose inhibits hunger contractions in dogs. In "Insulin" hypoglycæmia in normal dogs increase of gastric tonus and hunger contractions appear at a blood sugar concentration of 0.08% to 0.07%. The administration of glucose inhibits these contractions. In diabetes the hunger is associated with the inability of the tissue to utilize sugar. N. F. Fisher has shown that completely depancreatized dogs lose weight and die, despite the control of hyperglycæmia and glycosuria by "Insulin." Some dogs have been kept alive and in good condition with "Insulin" for some months after removal of the pancreas. The *post mortem* examination of these dogs has revealed the presence of a pancreatic "stump" with a certain amount of regeneration. It would thus seem that "Insulin" does not represent the entire pancreatic hormone.

Bodansky has shown that the liver plays an important part in the regulation of the normal concentration of the sugar in the blood. A progressive decrease in the blood sugar occurs after the total extirpation of the liver of dogs. No ill effects are observed until the blood sugar concentration reaches about 0.06%, when symptoms appear; with a further fall the animal dies in convulsions. Mann found that dogs from whom the liver has been completely removed, can be kept alive and in good condition for some time by the administration of glucose.

In regard to other ductless glands, Doisy, Allen, Ralls and Johnston claim that they have prepared a hormone from the ovary and from *liquor folliculi*. This hormone is not cholesterol, but is soluble in lipoid solvents. It is stable, even when immersed in boiling dilute acids and alkalis.

Abel has isolated a substance from the posterior lobe of the pituitary in the form of a tartrate. He does not claim that this substance is pure, but it is 1,250 times more powerful than histamine acid phosphate in its action on the uterus of a guinea pig. This substance in a dilution of 1: 75,000,000,000 produces strong contractions of the uterus. He believes that there is only one active substance in the posterior lobe of the pitutiary gland and that it acts as a hormone.

T. Lewis has made some extensive investigations on the skin capillaries and the vascular reactions of the skin to injury. He has proved that the capillaries of the skin can become actively contracted and that such contracted capillaries exert a force of from fifty to one hundred millimetres of mercury. The active contraction of the capillaries is seen in the "white line" reaction. A local dilatation of the skin capillaries, venules and terminal arterioles is associated with the production of wheals in the skin from any cause. The injection of minute amounts of histamine into the skin produces similar effects to strong external mechanical stimuli. He

has demonstrated that the responses of the skin to pin pricks, stings and bites from insects, mild scalds and burns, exposure to ultra-violet light and many other irritants are essentially determined by the action of one chemical substance and that all these results are of the same nature.

Biological Chemistry.

Since his appointment to the chair of physiology in the University of Adelaide Professor T. Brailsford Robertson has striven to promote the institution of a journal devoted to experimental biology. *The Australian Journal of Experimental Biology and Medical Science* has recently been founded. It is maintained out of a bequest to the University of Adelaide by Miss A. F. Keith Sheridan for medical research. Up to the present there has been no suitable medium in Australia for the publication of bio-chemical papers. The papers published in the proceedings of the several Royal Societies and similar scientific societies have been more or less lost to bio-chemists in other countries. The majority of the papers that have appeared in the new South Australian journal have been on bio-chemical subjects.

The mechanism of muscular action has been studied by O. W. Tiegs who has endeavoured to show that heat production in muscle doing work arises from physical causes and bears no direct relation to the amount of lactic acid formed during the muscular contractions. An interesting hypothesis to account for many of the phenomena of muscular activity has been advanced by this author.

T. Brailsford Robertson has given an account of the factors determining the duration of the period of lag in cultures of infusoria. His researches have been designed to investigate the effect of the accelerative agent or autocatalyst of multiplication which is accumulated by organisms living in crowded cultures. These experiments were undertaken to discover the explanation of the observation that the rate of growth of a culture inoculated with two individual infusorians is more than double that of a culture inoculated with a single individual.

Several new facts have been ascertained by L. M. Bryce, C. H. Kelleway and F. E. Williams concerning the characters of hydatid antigen. Hydatid fluid can serve as an antigen for the immunological diagnostic tests and can be employed as an anaphylactic antigen, an alcoholic extract of scolices is only useful as an antigen for complement fixation; it acts neither as a precipitating nor as an anaphylactic antigen.

A. B. Anderson has pointed out that "Insulin" is not as toxic to mice treated with phyloridzin as to untreated mice. As is well known phyloridzin diminishes the amount of glucose in the circulating blood. No evidence has been advanced to assist in explaining this observation. A method for standardizing "Insulin" has been devised by M. Cheadle. The standardization is effected by the employment of mice. The same worker has given an account of the effects of variations in the hydrogen ion concentration upon the activity of "Insulin" that has been subjected to high temperatures.

The death of Henry George Smith in September, 1924, demands mention in this place. His studies of the essential oils of the trees of the genus *Eucalyptus* led him many years ago in collaboration with R. T. Baker to advance the view that each species is characterized by an oil of almost constant composition. This hypothesis has been confirmed. Arising from it he carried out research to demonstrate the correlation between the chemical composition of the constituent tissues and the morphological botanical characters. The studies of plants of numerous natural families has provided many new substances to be used in the arts and in commerce. The Australian Chemical Institute has established a medal in his memory.

Among the more interesting discoveries made in biological chemistry during the year 1924 is the accumulation of data concerning the rôle of the ferment esterase in the formation of bone in cartilage. R. Robison has demonstrated that the bones and ossifying cartilages of young animals contain an enzyme which converts hexose mono-phosphoric ester into glucose and phosphoric acid. The deposition of calcium phosphate was seen in the split bones of rhachitic rats under the influence of phosphoric esters. Further experiments have been performed by Robison and H. D. Kay to show that blood contains phosphoric esters which undergo rapid hydrolysis when brought into contact with

bone enzyme under suitable conditions. The demonstration of the suitable substrate thus increases the probability that bone esterase plays a part in ossification in cartilage. Some study has been carried out of the conditions under which the increased concentration of phosphatic ions leads to the deposition of the solid phase of calcium phosphate.

E. C. Grey has produced evidence that bacteria can synthetize starch from glucose. Although this synthesis has been suspected for many years, satisfactory chemical evidence of the formation of starch from glucose has not previously been obtained.

The wide variation in the anti-rachitic and growth promoting qualities of milk from different sources has been recognized. E. M. Luce has carried a prolonged investigation of the anti-rachitic and growth promoting qualities of the milk of a single cow. This milk exhibited considerable change in these qualities. Luce has come to the conclusion that the diet exercises the greatest influence in modifying the amount of vitamin. Light appears to have a similar influence.

Attention has been directed by J. L. Stoddard and G. S. Adams to the methods adopted for the estimation of hæmoglobin. There has been much dissatisfaction among chemists on account of the variation in the results obtained. Haldane's method, which is based on a measurement of oxygen capacity yields result that are too low. The two investigators have found that the factor 1.15 should be employed instead of 1.34 for the oxygen capacity per gramme of hæmoglobin, if correct results are to be gained. This is an important matter in the determination of health standards of large communities.

Hygiene.

Even in a lean year the world's record of progress in hygiene must necessarily be of imposing dimensions. Last year was by no means a lean one in this respect. It therefore becomes a matter of considerable difficulty to compress this record into a small compass without many serious omissions. In the following brief survey only a few notable achievements are mentioned. In other chapters of this retrospect matters which might with justice be claimed for hygine and preventive medicine, have already been discussed.

The International Health Board of the Rockefeller Foundation has finally withdrawn from Australian soil, after very valuable collaboration with the Commonwealth and State authorities in connexion with the control of hookworm disease. The first phase of the Australian Hookworm Campaign has terminated with an able report by W. C. Sweet. The second stage is taking the form of a continuance of the survey work with mass treatment under entirely Australian control. S. M. Lambert, of the International Health Board, has published an admirable report on the health survey of the Gilbert and Ellice Islands with special reference to hookworm infection.

Under the auspices of the Health Organization of the League of Nations several important publications dealing with dysentery, its incidence, the relative frequency of bacillary and amœbic infections and the standardization of dysentery serum have been issued. The information contained in these publications is tending toward the better control of dysenteric infection.

R. W. Cilento has written a "Service Publication" on malaria and in it he has set out in an admirable manner all that is of importance in regard to the prophylaxis and control of malarial infections.

During the past twelve months a considerable amount of work has been carried out in all parts of the world in regard to the prevention of diphtheria. The application of the Schick test and the immunization of children found to be susceptible and exposed to infection continue to be the methods of greatest utility. Few new facts have been elicited in connexion with this subject or with the subject of tuberculosis control. T. Cherry has given statistical evidence in support of his hypothesis that the resistance to tuberculosis varies inversely with that to cancer. If this attractive suggestion should prove to be correct, it might be necessary to exercise special care in the adoption of all measures aiming at the prophylaxis of tuberculosis, lest the remedy should prove more disastrous than the evil itself.

Prophylaxis against venereal disease continues to occupy the attention of many hygienists. The great experiment in Australia of compulsory notifica-

tion and compulsory treatment is neither as successful as it might be nor as futile as its many opponents held that it would be. The acts are notoriously difficult to administer and much of the apparent failure is due to the fact that the clauses are not ruthlessly enforced. Direct prophylaxis of venereal disease has its limitations in a civil community. It must be carried out by trained persons under medical supervision; it has little or no significance as a national measure unless a large majority of those exposed to possible infection are subjected to it. No mention is made of individual prophylaxis or so-called "blue light depôts" by Sir George Newman in his latest report of the Ministry of Health of Great Britain.

The most important matter in the realm of hygiene and preventive medicine that has occurred in Australia during the year is the appointment of a Royal Commission to inquire into and report upon public health as a matter of legislation and administration by the Commonwealth in conjunction with the States when necessary. The reference of this commission is very wide and it is anticipated that the existing defects that need remedy, will be carefully analysed in order that the measures recommended will, when adopted, lead to a material improvement in the health of the people of Australia.

In industrial hygiene much activity has been displayed and many advances have been recorded. The departure of Dr. A. J. Lanza from Australia terminated the period of establishment of the Section of Industrial Hygiene of the Commonwealth Department of Health. The work is now being carried on by Dr. D. G. Robertson and Dr. Frank L. Kerr. Special attention has been paid to the health of miners and to the conditions of their work. An interesting survey of the health conditions of the miners at Port Pirie is about to be conducted. Dr. C. Badham has been appointed medical officer of a special branch of the Department of Public Health of the State of New South Wales dealing with industrial hygiene.

An important conference on factory inspection from the health point of view has been held in Geneva. This was the fifth International Labour Conference. The League of Nations and the Medical Research Council have attacked many problems connected with the hygiene of the factory, of the workshop and of the home. All this work has a great significance, indicating that the systematic protection of the worker against industrial hazards, diseases arising in the course of various occupations and accidents in factories is rapidly becoming a function both of the health authority and of the employer. The adaptability of the worker to his special task, both psychically and physically, is important not merely to the individual concerned, but also to the industry and to the community. It has become apparent that industrial hygiene possesses an economic significance and is an essential factor in the enhancement and maintenance of the prosperity of a nation.

Dermatology.

The general practitioner is usually familiar with a few of the commoner forms of skin affections and leaves the task of distinguishing between the rarer conditions to the dermatologist. While special study is essential for the practice of the specialty, a relatively comprehensive knowledge of the characters of the more important skin lesions is eminently desirable for a modern general practitioner or physician. It is significant that dermatologists are demonstrating an ever increasing number of skin diseases at the meetings of the Branches of the British Medical Association in Australia, as this offers an opportunity to other medical practitioners to become acquainted with the appearances and vagaries of many of the rashes and skin lesions. Interest has also been manifested by physicians, neurologists and others in skin affections complicating general pathological states in recent years. In Australia the association between *adenoma sebaceum* and epilepsy in the condition known as epiloia has been the subject of an important communication by W. A. T. Lind. This subject has been mentioned in another section of this retrospect. Scleroderma has long presented some difficult problems for physicians and neurologists to solve. Its ætological basis has not yet been determined, although three plausible hypotheses have been put forward. A Holmes à Court has made some careful observations on this disease.

Syphilis, as usual, provides a great deal of the material with which the dermatologist is concerned.

E. Ahlswede has reported the development of a lichenoid rash and even true *lichen planus* as a result of treatment by the arseno-benzol drugs. He assumes that this dermatitis arises in persons with a tendency, either inherited or acquired, to nervous disturbances and that in predisposed persons a gastro-intestinal, hepatic or other reflex may elicit a response in the skin.

The ætiology of eczema is still being investigated. It is usually taught that eczema may arise as a result of the disturbance of carbo-hydrate and fat metabolism. D. S. D. Jessup has demonstrated that neither the increase of the sugar and fat contents of the diet nor their decrease influences the course of the disease under treatment. Some speculation has been put forward, apart from the suggestion that eczema is due to a disturbance of carbo-hydrate and fat metabolism, that this disease is at times caused by disturbances of the glands of internal secretion, that it arises as a manifestation of anaphylaxis and that septic foci may lead to its appearance. The evidence offered is insufficient and unconvincing.

The view that *lupus erythematosus* is not a tuberculous disease, but the result of the absorption of the dissociation products of bacterial or other proteins is gaining ground. J. H. M. Macleod admits that irritants, including the rays of sun light, act as predisposing causes of this condition; the rash, however, does not arise as a result of the trauma of an irritant. He postulates a general toxæmia or septicæmia as the cause of the acute form, while he attributes the chronic form to the action of bacterial proteins. Unfortunately the glib use of the term toxæmia, when the toxin cannot be produced, like the postulation of a septicæmia without the production of a pathogenic organism in the blood, savours of speculation.

The nature of erythema and other cutaneous reactions has claimed attentioned. S. E. Dore has pointed out that the control of the capillaries of the peripheral circulation by the central nervous system is of paramount importance in this connexion. The cutaneous reactions appear to depend on a disturbance of the normal adjustment of the size of the capillary tube. Dilatation occurs as a reflex act, a form of nervous balance, in response to the chemical or physical stimulation of the vaso-dilator centres. There is still much experimental work to be carried out before the complete mechanism of the various erythemata can be adequately explained.

The treatment of lupus and rodent ulcer by radium, by X-rays, by diathermy and by surgical interference continues to give rise to controversy. P. Langloh Johnston has produced some excellent results from the use of radium.

Current Comment.

BLOOD PLATELETS IN THE SPLENIC CIRCULATION.

IN July, 1924, we drew attention to the success which had been achieved by the adoption of splenectomy in *purpura hæmorrhagica* and to the increase in the number of blood platelets following this operation. It was pointed out that the diminution in platelets found in this disease could be explained only in one of two ways. Either there is a lessened production in the number of platelets or there is an increased destruction of these bodies. For this reason observations on the platelets are of value.

Dr. Jackson K. Holloway and Dr. Launcelot M. Blackford have recently carried out observations on the blood platelet count in arterial and venous blood from the splenic circulation.[1] They endeavoured to ascertain whether the platelet count of blood from the splenic vein differed from that of the splenic artery and whether there was any difference in counts made of the blood from the peripheral veins and peripheral arteries in normal dogs. Dogs were anæsthetized and samples of blood taken carefully from the splenic artery and vein. They found that in nine among twelve instances venous blood manifested an increased blood platelet count as compared with arterial blood, in both splenic and peripheral circulation. They state that they offer no explanation for the difference. They add that they have proved to their satisfaction that in the dog the platelet count of blood from the splenic vein is not normally reduced below that of blood from the splenic artery. They regard this as in keeping with physiological principles for they see no reason why platelets or any blood corpuscles should be materially reduced in number by a single passage through the spleen.

The series of experiments is too small to allow of the formation of any definite conclusions. Moreover, the counting of blood platelets is notoriously difficult and the margin of error is very wide. The estimation of the blood platelet count in blood from the splenic vein in purpuric conditions would, as Drs. Holloway and Blackford suggest, be of especial importance in regard to the suitability of splenectomy as a surgical procedure in their treatment.

[1] *The American Journal of the Medical Sciences*, November, 1924.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Dermatitis Due to War Substitutes.

E. GALEWSKY (*Klinsche Wochenschrift*, September 23, 1924) describes numerous forms of dermatitis met with in Germany during the war due to the use of substitute materials. In particular he refers to lubricating oil. Three forms of oil dermatitis were observed: (i.) An acute moist form seen on the face, hands and forearm, (ii.) a follicular eruption on the back of the hands, forearm and arm. When these became chronic they were pustular and infiltrated and spread over the body. (iii.) A bronze to sepia-brown discoloration of the face, especially round ears, nose and throat. A diffuse melanosis gradually spread over the whole skin of every patient. The epidemic reached its height in 1917-1918 and no cases have been seen since 1919. The exact cause was unknown, though it was probably associated with malnutrition and the effect of the light on the skin. After the armistice there was still a difficulty in procuring pure chemicals and numerous cases of dermatitis occurred especially from substitute lac dyes. In one sewing machine factory one hundred and twenty workers out of a thousand were affected. Similar trouble arose in stocking factories and in the manufacture of leather hat bands and wristlet watch straps and sealing wax. An outbreak in a match factory was traced to the use of red phosphorus. As noted in England, many acute infections were traced to badly dyed black furs, while dermatitis due to lacquer on Mah Jongg sets, walking sticks and telephone receivers are also becoming more numerous. Once the cause has been discovered and removed, mild remedies are sufficient. When the area is moist, 0.25% to 0.5% solutions of resorcin or acetic acid are useful. When the skin is dry, zinc pastes or spirituous solutions of zinc and talcum should be employed.

Bismuth Treatment of Syphilis.

J. BIRNHAM (*Klinische Wochenschrift*, November 4, 1924) gives his experiences with two preparation of bismuth, "Bismogenol" and "Mesurol." He considers that it is a very valuable drug, that it can be usefully given in conjunction with "Salvarsan," but that it cannot supersede the latter. It is of great value in cases in which mercury and "Salvarsan" are contra-indicated and can also be successfully given in early primary and secondary conditions. The author gives a bismuth course for all resistant conditions in patients who react to the Wassermann test on the theory that, like quinine and "Salvarsan" in malaria, the interposition of bismuth will break up the immunity of the spirochæte to mercury and "Salvarsan."

Foreign Protein Therapy and Erysipelas.

THOMAS A. LEBBETTER (*The Canadian Medical Association Journal*, December, 1924) discusses the results of foreign protein therapy in relation to erysipelas. The first experiments in parenteral protein therapy were made by Unna in the 'nineties. Unna produced good results in the treatment of leprosy by the injection of meat juice. Mathieu proved that deutero-albumose was able to elicit the reaction of tuberculin. Von Pirquet in 1905 showed that the parenteral introduction of ordinary horse serum caused peculiar effects. Schmidt, of Prague, produced surprising results by the intra-gluteal injection of ordinary cow's milk. The injections were followed by a rapid rise in temperature and it was further shown that this artificial fever possessed a curative effect in certain neoplasms, progressive paralysis, chronic arthritis and in many of the acute infectious fevers. Schmidt treated patients suffering from erysipelas by injections of milk. He produced a definite arrest in the spread of the disease and a decided improvement with rapid decrease in the temperature in the great majority of instances. The author recalls the histories of twelve patients whom he treated by this means. Eleven were seen before the fifth to the seventh day of the disease. In four the temperature was reduced to normal and all other symptoms were arrested within twenty-four hours of the first injection; in four these improvements were noted within forty-eight hours and in three the interval of time was seventy-two hours. The author prepared fresh whole milk by placing it in a sterilized container which was put into a water bath. The water was boiled for ten minutes. The milk was then shaken well and given either by subcutaneous or intra-muscular injection. The usual dose was three to five cubic centimetres. This dosage may be repeated if deemed necessary for four or five consecutive days. The author points out that anti-streptococci serum is expensive, uncertain in its action and not always available for immediate administration. Moreover, it is often necessary to use an autogenous vaccine in conjunction with the serum. Foreign protein such as cow's milk is cheap, simple to prepare and within the immediate reach of every general practitioner.

Lupus Erythematosus and Alopecia Areata.

M. G. HANNAY (*The Lancet*, November 29, 1924) records the history of a woman, aged thirty-two years, who suffered from *lupus erythematosus* of the face for twelve months. While the patches on the face were still present several typical areas of *alopecia areata* appeared on the scalp. These areas extended rapidly until more than half the total area of the scalp was completely bald. Growths of *Staphylococcus aureus* and *Bacillus coli communis* were obtained from cultures taken from the mouth, naso-pharynx and fæces. Two doubtful tooth stumps were withdrawn. A streptococcus was isolated from the naso-pharynx and a composite vaccine was used. The hair began to grow and did not fall out again, the facial lesions improved, but did not completely disappear. In discussing the condition the author refers to the views held in regard to the toxic origin of both diseases. He states that if toxins of various kinds may be the cause of both affections, a common factor becomes possible. Hence it is not surprising to find the two conditions co-existing in the same patient.

Lymphatic Leuchæmia with Erythrodermia.

J. M. H. MACLEOD AND J. E. M. WIGLEY (*Proceedings of the Royal Society of Medicine*, December, 1924) record the history of a patient whose disability commenced two years ago with severe irritation all over the body. In January, 1924, the skin became red. The blood and urine at this time were normal. In May, 1924, the face became bright red and began to "weep." Scaling and crusting of the face and ears occurred. This improved under simple emollient treatment. In August, 1924, crusting of the face, ears, hands and feet was present. The skin over the whole body was brick red in colour and felt thickened on palpation. Irritation was present. Slight enlargement of lymphatic glands was present. The glands were not tender. The urine was normal. The serum did not react to the Wassermann test. The leucocyte count was 13,000 per cubic millimetre and 82% of the cells were small lymphocytes. Lymphoblasts numbered 0.5%. Histological examination of the skin revealed thickening of the epithelial layers with deformity of the papillæ. Around the papillæ there was an infiltration with small round cells which were mostly lymphocytes. On examination of a lymphatic gland it was found that the orderly arrangement of the glandular substance was obliterated and that no germ centres could be found. The capsule of the gland was thickened and infiltrated with small lymphocytes. The lymph channels in the gland substance were much dilated and contained large, pale, round cells of lymphocytic character. The endothelium of the channels was swollen and in places desquamated. The authors in reporting the case expressed the opinion that it conformed to the condition described by Sequeira as lymphoblastic erythrodermia in which there was generalized erythrodermia and a moderate lymphocytic leucocytosis. They could see no special reason for creating this new group. They thought that it might well be regarded as a variant of lymphatic leuchæmia. A. Piney in discussing the case at the meeting at which it was reported, said that from the hæmatological point of view alone the condition was not a leuchæmia. In all reported cases the total white cell count was low. He regarded the condition as an aleu-

chæmic lymphadenosis associated with a peculiar deposition of lymphocytes in the skin causing erythrodermia.

RADIOLOGY.

Radio-Therapy of Lymphoid Tissue.

C. A. RUTHERFORD contributes an article on the X-ray treatment of tonsillar and associated lymphoid tissue (*North-West Medicine*, June, 1924). Lymphoid structure is particularly susceptible to X-ray application and such tissue may be completely destroyed without surrounding tissue becoming affected. Reamer and Witherbee have elaborated the safe skin unit dosage; the four factors that go to make this dosage, are the milliampèrage, voltage, target distance and time. The Rockefeller Institute report atrophy of the tonsils after radiation. Hickey notes that diphtheria carriers are cured within two to four days of radiation. Whooping cough responds rapidly to radiation of the lymphoid tissues of the throat. Small repeated dosage is recommended, one-twentieth to one-fifth of a skin unit being given at intervals of two weeks.

Apical Sepsis.

W. L. SHEARER AND A. F. TYLER (*American Journal of Radiology*, June, 1924) discuss the principles underlying the removal of focus at the apices of teeth. The authors insist on the need for proper interpretation of dental skiagrams and of the pathological appearances is absolutely necessary to proper interpretation. Experience shows that skiagrams do not give full indication of the extent of the pathological process owing to the fact that absorption of the lime salts has not progressed sufficiently at the margins to alter appreciably the X-ray shadows. It is to be remembered that the process in the bone is always more advanced than the disease of the tooth root. The authors point out that the original pathological lesion is in the pulp chamber and following the line of least resistance it eventually involves the peri-apical bone. Death of the tooth pulp precedes peri-apical absorption. Chronic and acute abscesses occur; the latter cannot be demonstrated in skiagrams as it is a rapidly progressive condition and needs urgent surgical attention. The chronic abscess, however, causes slowly progressive, peri-apical changes. The chronic abscess usually becomes surrounded by a fibrous membrane and the pus is absorbed into the lymphatics and venules, with consequent absorption of toxins into the general circulation. The authors recommend complete removal of the diseased tooth and the peri-apical bone under general anæsthesia. The diseased area is completely exposed. Such removal is not accompanied by any post-operative febrile reaction and primary healing practically always occurs. Dentures should be supplied at the end of from three to six weeks. A detailed description of the technique employed is given in the article.

Diaphragmatic Hernia.

M. E. STEINBERG AND F. B. PATERSON report a case of diaphragmatic hernia in a man, aged twenty-two years (*North-West Medicine*, June, 1924). Screen examination revealed a collection of fluid above the left half of the diaphragm and an opaque meal proved this to be due to fluid in a displaced stomach. About two-thirds of the stomach lay in the thorax and extended as high as the level of the anterior end of the second rib. The stomach emptied slowly and the duodenum could not be defined. In all probability the rupture of the diaphragm was due to an injury which occurred many years previously and resulted in a fracture of the pelvis. Such injuries are occasionally accompanied by a rupture of the left side of the diaphragm which is unprotected by the liver as on the right side.

Deep Therapy and Diathermy.

ANDREW CHARLES (*Journal of Cancer*, April, 1924), discusses the treatment of malignant growths by combined diathermy and deep X-ray therapy. In diathermy the electrical oscillations produced by the discharge of condensers cause an oscillation of the atoms and molecules with a tangible resultant heat. The greater the amplitude of the oscillation and the greater the resistance, the greater the heat generated in the tissues. Medical diathermy produces hyperæmia, while surgical diathermy produces coagulation and necrosis of the tissues and acts as a canting. The author describes his technique. He usually operates with the patient under anæsthesia. Coagulation of tissue occurs and there is no hæmorrhage when the necrotic area separates. Infection is prevented by the heat produced and there is little or no shock. The resultant scar is very resistant to the implantation of surviving malignant cells. After destruction of the local lesion by diathermy deep X-ray radiation is given over the area treated. One great advantage of this combined treatment is seen in hopeless conditions, for in these life may be prolonged and the patient freed from pain and misery.

X-Ray Effects.

M. B. R. SWANN contributes an article on the immediate effects of X-rays on the function of certain tissues and organs (*British Journal of Radiology*, June, 1924). Profound histological changes follow radiation of tissues and these changes have been situated in the skin, the blood and the cells of neoplasms. The author describes his methods of investigation and arrives at several important conclusions. There is a gradual and regular lowering of the blood pressure in animals and if the exposure is prolonged, death results from cardiac failure. An adequate explanation of this fall is not yet forthcoming. Respiration is stimulated by short and depressed by long exposures. The vagus, sympathetic and splanchnic nerves are rendered more sensitive by short exposures and depressed by longer ones. Uterine contractions are caused by exposures with a general rise in tone and it takes some hours after exposure before the muscle returns to normal. Isolated rabbit intestine manifests a steady rise of tone during exposure with increase in intestinal movements.

Radiography of the Pulmonary Apex.

D. GÄBERT (*Klinische Wochenschrift*, November 18, 1924) describes his technique for obtaining clear pictures of the pulmonary apices especially in early tuberculosis. The patient, either standing or sitting, faces the tube with the chin raised as much as possible. The shoulders are depressed and the arms allowed to hang down, thus permitting the clavicles to occupy a lower level. By these means the second intercostal space and to a lesser extent the first are freely exposed. With this method the earliest foci can be more easily detected than by the more usual dorso-ventral route.

Limits of Deep Radiation.

HANS HOLFELDER, of the surgical clinic of the University of Frankfort, writes on the limits of deep X-ray therapy and operation in the treatment of malignant growths (*Journal of Cancer*, April, 1924). Operative procedure in malignant disease is quite well defined, but deep radiation is not on so firm a footing and there are to-day distinct and different methods of treatment which yield good results. The author deplores the over-estimation of deep therapy. The aim in the application of deep radiation should be to deliver a massive dose to the diseased area and to avoid local and general effects and in this treatment the art and skill of the X-ray specialist are decisive factors. Modern apparatus is of little value unless the operator knows how to use it. The author thinks the theory of X-ray idiosyncrasy should be abandoned as such instances he has seen, have been due to error in dosage. He strongly insists that really operable cancer should be operated upon at once and in such instances no delay should be countenanced to allow of radiation. A combination of surgery and radiation is the ideal method and if such combination is practised, many mutilating operations are avoided. In breast cancer the early growths are curable surgically, while in more advanced conditions the author claims cures in 46% to 66% in his clinic during three years. Post-operative radiation has proved most successful in reducing the recurrence percentage. Detailed information of cancer of the various regions is given in the article. In sarcomata the outlook is much better than in carcinomata.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Walter and Eliza Hall Institute for Research in Pathology and Medicine, Melbourne Hospital, November 19, 1924, DR. J. W. DUNBAR HOOPER, the President, in the chair.

Hydatid Disease.

DR. H. R. DEW in introducing the discussion on hydatid disease referred to the various methods of diagnosis at disposal, clinical, radiological and immunological. During the period from 1911 to 1922 the first two methods had led to a correct diagnosis in 47% of one hundred and eighty-two patients. Dr. N. H. Fairley had investigated the immunity reactions, especially the complement fixation test and had put this test on a proper basis. Thanks to his efforts a suitable technique had been developed and a correct diagnosis could be obtained in about 80%.

The fixation test was a specific one and its validity had been upheld in hundreds of cases. The technique was similar to that used in carrying out the Wassermann test. A specific hydatid antigen was used. The test was quantitative and appeared to depend on the presence in the blood of persons suffering from hydatid disease of a specific antibody which in the presence of specific hydatid antigen had the power of combining with complement which could not then be detected by means of a sensitized system. The factors on which the test depended, were further discussed and the fact that complications to the cyst usually caused a rise of antibody with consequent fixation of complement was emphasized.

In patients before operation a reaction was obtained in 81%. The conditions under which no reaction was obtained, were analysed and the failure to obtain fixation in children and in persons with simple uncomplicated large cysts was explained.

After operation there was usually a rise of the amount of complement fixed followed by a fall within two months in cured patients. Graphs were shown to illustrate this. If the power to fix complement persisted over this period, it was almost certain that a residual cyst was present. Recurrent cysts, too, led to a second rise in the amount of complement fixed. The test therefore was a very valuable one from the point of view of prognosis. Graphs and tables of figures were shown to illustrate this.

The precipitin test was shortly discussed. It had the advantage of being single and gave good results in the presence of definite infestation; the precipitin reaction followed the fixation fairly closely. It was not as delicate as the fixation test, needed greater experience in interpretation and it was difficult to make it quantitative.

The intradermal Casoni test was described and figures, graphs and tables shown to illustrate it. The importance of controls, of experience in the test and some of the fallacies were explained. Care was needed when skin diseases, jaundice, sensitive skin and similar conditions were present, in order to avoid pseudo-positive findings. The test did not follow the fixation and appeared to be partly of an anaphylactic nature. The special value appeared to be in uncomplicated cases where there had been enough antigen absorbed to produce sensitization, but not enough to produce sufficient antibody to be detected by the relatively coarse method of complement fixation. The test was specific and a positive response meant past or present hydatid disease. It had no value in the post-operative stage, as the patients appeared to keep their sensitiveness for many years. As a rule after operation the patient reacted to the test.

In concluding the following summary was given:

1. The complement fixation test yielded a reaction in 81% of all cases of hydatid disease and 95% to 100% in all complicated cases.

2. The complement fixation test had a particular value in post-operative cases when recurrent or residual cysts were suspected.

3. The Casoni test had a great value in detecting uncomplicated cysts and by comparing the results with those of the complement fixation test a diagnosis should confidently be made in 90% of cases.

4. The Casoni test had no value after operation.

The paper was illustrated throughout by lantern slides, giving figures and graphs.

DR. C. H. KELLAWAY said that he did not propose to attempt to discuss fully the theoretical aspects of the immunological tests for hydatid disease, but only to put forward some interesting points which emerged from work done during 1923 in the Walter and Eliza Hall Institute by Miss Williams, Dr. Bryce and himself and published recently in *The Australian Journal of Experimental Biology and Medical Science.*

In the first place the precipitin reaction in persons infested with hydatid disease appeared to resemble closely other precipitin reactions obtained in animals experimentally immunized with foreign protein, save that, as K. D. Fairley had pointed out, inactivation by heat took place at a somewhat lower temperature. By using quantitative methods they had found that inactivation of precipitin commenced at 50° C. and was completed by exposure at 60° C. for half an hour. Other precipitating antibodies were inactivated at a somewhat higher temperature, 70° C.. With this slight quantitative difference the precipitin produced in hydatid patients was similar to other precipitins in respect of its inactivation to a precipitoid form by heat and its capacity to confer passive sensiiveness in animals. It was true, as other workers had found, that passive sensitiveness was conferred somewhat irregularly and only by strongly precipitating sera, but this irregularity was due in part to the weak protein solution which was used as antigen, namely hydatid fluid.

In N. H. Fairley's important paper in which he had discussed the complement fixation reaction in hydatid disease, he had hinted that the antigen responsible in this reaction need not necessarily be of protein nature, but might be a lipoid or lipoid-protein complex. Their own recent investigations had been concerned with this point. The most active antigen for complement fixation tests in hydatid disease was the alcoholic extract of scolices described by Patterson and Williams. This antigen contained only traces of protein and was useless for precipitin reactions even with highly precipitating sera. It did not act as an anaphylactic antigen, for they had not succeeded, even with large doses of this antigen, in producing active sensitiveness in guinea pigs. Furthermore it gave only a feeble Casoni reaction in highly sensitive patients when injected intradermally. In contrast to this antigen hydatid fluid could be used to produce active sensitiveness in guinea pigs, was the best antigen for the intradermal test and gave good precipitation with active precipitating sera.

It seemed evident that the complement fixation reaction was different in nature from the precipitin and Casoni reactions, a fact which might account for the lack of parallelism exhibited by the reactions.

In the Casoni test they were concerned with two different manifestations both of which appeared to be specific and which sometimes occurred together, but might be dissociated. There was the immediate wheal resembling that produced by the intradermal injection of minute doses of histamine, which occurred within twenty minutes and appeared to be an anaphylactic phenomenon. It seemed probable that this part of the reaction was due to a local anaphylactic shock affecting the endothelium of the capillaries and allowing of the effusion of fluid into the tissues. There was also the more delayed swelling and erythema sometimes persisting, as Mr. Dew had pointed out, up to forty-eight hours, which seemed to be due to other causes and might not of necessity be an anaphylactic response to hydatid protein.

He had not attempted to consider the fundamental problem as to whether these various immunological reactions represented the attempt of the organism to combat the hydatid infestation or whether they were merely side products of the defensive reaction of the host against the parasite, but a consideration of the facts presented made the latter view probable.

DR. N. HAMILTON FAIRLEY, O.B.E., after having expressed the very great pleasure he felt in being present, said that he had listened with much interest to the excellent expositions of Mr. Dew and Dr. Kellaway on the subjects of the reactions employed in the present day diagnosis of hydatid disease and the theoretical considerations underlying them. It was in connexion with the Casoni reaction that the immunological problems raised were particularly complex; he had almost come to feel that the more he studied immunology, the less he knew about it.

From the practical point of view the Walter and Eliza Hall Institute had to its credit the fact that laboratory diagnosis of hydatid infestation could be guaranteed in 90% of all cases. It was very interesting to note that a number of subjects of hydatid disease whose sera failed in the complement fixation reaction, responded to the Casoni intra-dermal test. In regard to the complement fixation reaction it had occurred that some of the doubtful results might be clarified by the expedient of giving the patient an intravenous injection of an alcoholic extract of antigen before examining the serum. He had found when working on the complement fixation reaction in bilharziosis that a preliminary intravenous injection of antigen in the experimentally infected animal invariably led to the fixation of a greatly increased amount of complement within seventy-two hours; the number of minimum hæmolytic doses deviated would sometimes rise as high as sixty or seventy. This was a provocative test adopted under circumstances somewhat similar to those in which a preliminary injection of "Salvarsan" was given in investigating the Wassermann reaction. Alcoholic extracts contained lipoid in considerable quantity, but only minute traces of protein and in consequence were free from the danger of producing anaphylactic phenomena. An alcoholic extract of scolices given by the intravenous route might prove a valuable provocative injection in doubtful cases of echinococcosis.

A point raised by Dr. Kellaway in connexion with the Casoni reaction was its similarity to the precipitin reaction. The Casoni reaction was certainly independent of complement fixation and its basis appeared to be sensitization to hydatid protein or its derivatives. He would like to hear Dr. Kellaway's views as to whether the two distinct maifestations of the Casoni reaction were dependent upon the presence of two different substances in hydatid fluid. The injection of the minute amount of protein contained in the fluid might be held to account for the initial phenomenon, the urticarial wheal, in a patient sensitized to hydatid protein by having been for some time the host of a cyst. Might not the later aspects of the Casoni reaction, erythema and induration, be dependent on chemical substances of smaller molecular size than hydatid protein from which they might originate? The recent work of Zinsser on residual antigens suggested this possibility and were it found correct, it would bring this phase of the Casoni reaction into line with the tuberculin, typhoidin and mallein tests.

In conclusion, Dr. Fairley said that he would like to ask Mr. Dew if he could state a definite period in months after which the persistence of the complement fixation reaction was to be interpreted as indicative of recurrence of hydatid disease following the extirpation of one or more cysts by operation.

DR. W. J. PENFOLD asked if sensitiveness to the Casoni reaction could be passively induced in animals. He had tried to obtain passive sensitiveness to tuberculin in animals by the inoculation of tuberculous sera, but had met with no success.

DR. J. F. MACKEDDIE said that he found the discussion very interesting, particularly as he had just returned from travel in countries where hydatid disease was a rarity. An Australian abroad was regarded as an authority on hydatid disease and was frequently credited with knowledge amounting to second sight in this subject. Within recent months he had seen at the Mount Sinai Hospital in New York a man suspected of echinococcus infection. The complement fixation reaction had not been carried out because there had been no available supply of antigen. Suppuration of the cyst had not been in question and the physicians in charge had not been able to grasp his point of view when he had said that the patient was too ill to be the subject of an uncomplicated hydatid cyst.

Dr. MacKeddie said that the serological and intradermal tests should be carried out as a matter of routine in obscure illness. Hydatid disease not uncommonly declared itself when least suspected. He quoted the case of a lady in whom from a consideration of her general condition, the lemon-yellow colour of the skin, absence of free hydrochloric acid in the gastric contents and the findings in the blood film, pernicious anæmia seemed a reasonable diagnosis. Some months later operation on this patient disclosed a suppurating hydatid cyst.

He recollected another patient who had suffered from epileptiform seizures at intervals for a period of ten years. The onset of paresis provided a localizing sign and operation had been undertaken with the result that a hydatid cyst in the brain had been shown to be the basis of the symptoms. In these two instances application of the complement fixation reaction and the Casoni test would have saved much time and trouble. If, as it appeared, the Casoni reaction rested on a true sensitization of the patient to hydatid protein, it was to be expected that it would persist an indefinite number of years after the cure of the disease.

DR F. L. DAVIES said that it might be of interest to members who had been present at the last meeting of the St. Vincent's Hospital Clinical Society, to hear the subsequent course of one of the patients shown at that meeting. The patient to whom he referred, was a woman in whom the leading clinical features were an enlarged liver and percussion dulness over the greater part of one side of the chest. The radiographic film was not conclusive. The patient's serum had reacted to the Wassermann test; the result of the complement fixation test with hydaid antigen had not supported hydatid cyst as the diagnosis. On the other hand, a strong positive reaction had been obtained to the Casoni intradermal test. By exploratory operation a hydatid cyst had been demonstrated in the lung, but there had been no exploration of the liver.

DR. R. J. BULL said that he was reminded of some interesting experiences in connexion with the microscopical identification of hydatid elements, upon which until the perfection of the specific tests under discussion, laboratory diagnosis entirely depended. He recalled a specimen of sputum sent to the Melbourne University Bacteriological Laboratory for examination with respect to the presence of tubercle bacilli, in which hydatid hooklets had been observed in almost every field of the Ziehl-Neelsen preparation. The laminated membrane of the cyst had often been noted in discharges from diverse sources and not uncommonly the presence of hydatid had not been suspected by the practitioner who had submitted the specimen. The development of the serological diagnosis of hydatid infestation achieved by the workers at the Walter and Eliza Hall Institute had provided an instance of that perfect cooperation between laboratory workers and clinicians which was so essential in medical research.

Attention had been drawn to the necessity for care in the interpretation of the reactions in the Casoni test. It occurred to him that some of the "pseudo-positive" results might depend on dietetic immunological effects. In the course of his experience of the Wassermann test he had noted from time to time that some human sera contained specific hæmolysin for sheep's red cells and thought that perhaps the consumption of imperfectly cooked mutton might have resulted in the production of such hæmolysin. Such subjects might possibly have been sensitized to the proteins of sheep's serum; he understood that the hydatid fluid used in the Casoni test was often collected from sheep and if a trace of sheep's serum gained access to the fluid, the fluid when injected intradermally would provoke an anaphylactic response in an individual of the type he had indicated.

DR. J. W. DUNBAR HOOPER paid a tribute to the highly scientific work carried out at the Institute, one result of which was the very great advance in the laboratory diagnosis of hydatid disease. It afforded him particular pleasure to welcome Dr. N. Hamilton Fairley, whose name was so eminently associated with the serological detection of hydatid.

MR. H. R. DEW in reply to the question asked by Dr. Fairley regarding the post-operative period after which persistence of the complement fixation reaction was to be interpreted as indicative of a residual cyst or recurrence, said that if the reaction was sustained for twelve months the inference was that a residual cyst was present. The decline of the complement fixation was influenced by various factors, such as the number of units of complement originally fixed, the amount of hydatid fluid spilt at operation and whether drainage had been employed or not. The time required for the disappearance of the reaction varied from four to twelve months. The complement fixation reaction due to the recurrence of a cyst might not be developed for two or three years, as it was necessary for time to elapse for a daughter cyst implanted at operation to grow and produce antibody.

The microscopical tests to which Dr. Bull had referred, were carried out in the Institute as a matter of routine. There was no feature of the echinococcus cyst more distinctive than the laminated membrane; it was remarkable how resistant this structure was and after prolonged retention in suppurating cavities it was recognizable. The special tests under discussion aimed at the detection of hydatid cysts before some complication or accident resulted in the discharge of products which could be identified as constituents of the hydatid cyst.

DR. C. H. KELLAWAY in reply to Dr. Penfold, said that at the Walter and Eliza Hall Institute they had not attempted to induce passive sensitiveness to the Casoni reaction in animals for the reason that hitherto they had not even succeeded in obtaining a skin reaction by active sensitization. The difficulty was that it was not possible to obtain a sufficiently strong solution of hydatid protein; if this obstacle could be overcome, there should be no bar to the successful induction of both active and passive sensitiveness.

He was in complete theoretical agreement with Dr. Fairley's suggestion regarding the two aspects of the Casoni reaction and his own conception, unsupported as yet by any valid evidence, was that the two totally different reactions involved in the Casoni test were capable of the explanation advanced by Dr. Fairley. He regarded the wheal as a true anaphylactic manifestation, although it was possible that there might be toxic bodies present in hydatid fluid which would act in the same manner as histamine when injected intradermally.

He considered the suggestion of Dr. Bull that pseudo-positive results in the application of the Casoni test might depend on sensitiveness to sheep protein on the part of the patient as feasible in some instances. Great care, however, was exercised in the collection of hydatid fluid to avoid contamination with sheep's serum or protein. Dr. Bryce and he by methods based on anaphylactic reactions, had been unable to demonstrate even minute traces of sheep's serum in samples of hydatid fluid.

A Device for Microscopical Study.

At the conclusion of the discussion, DR. W. J. PENFOLD exhibited a device of his own design which when fitted to a microscope, enabled the observer to work comfortably without tilting the instrument and so inclining the stage. For many purposes, such as the examination of hanging drop preparations and the enumeration of cells in the hæmocytometer, it was not feasible to incline the stage of the microscope. The fitting shown obviated the inclination of the stage, while enabling the microscopist to maintain the same position of ease as that obtained by tilting the instrument.

NOMINATIONS AND ELECTIONS.

The undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Beavis, Walter Ramsay, M.B., M.S., 1918 (Univ. Sydney), 175, Macquarie Street, Sydney.

Byrne, Thomas Patrick, M.B., Ch.M., 1924 (Univ. Sydney), 20. Wemyss Street. Marrickville.

Byrne, Vincent Charles, M.B., Ch.M., 1923 (Univ. Sydney), Cameron Street, Kogarah.

Carmichael (*née* Pyne), Theresa Mary, M.B., Ch.M., 1923 (Univ. Sydney), 422, Marrickville Road, Marrickville.

Colwell, Alan Rudford, M.B., Ch.M., 1923 (Univ. Sydney), "St. Luke," Darling Point Road, Darling Point.

Duke, Frederic Reginald Edward, M.B., Ch.M., 1923 (Univ. Sydney), Orange.

Finlayson, Norman Bain, M.B., Ch.M., 1924 (Univ. Sydney), Newcastle Hospital.

Kilgour, Keith Alexander Macaulay, M.B., Ch.M., 1924 (Univ. Sydney), 38, Alt Street, Ashfield.

Kirkpatrick, Edward Roger Graham, M.B., Ch.M., 1924 (Univ. Sydney), Callan Park, Rozelle.

Law, Thomas Boyd, M.B., Ch.M., 1924 (Univ. Sydney), Ullathorne Street, Drummoyne.

Leadley, James Harold Willmott, M.B., Ch.M., 1921 (Univ. Sydney), Armidale.

Scobie, Derek Campbell, M.B., Ch.M., 1924 (Univ. Sydney), New Lambton, Newcastle.

Walker, William Jack, Osmond, M.B., Ch.M., 1924 (Univ. Sydney), Marrickville Hospital.

THE undermentioned have been elected members of the Victorian Branch of the British Medical Association:

Bladen, Bryant Oswald, M.B., B.S., 1924 (Univ. Melbourne), 31, Balwyn Road, Canterbury.

Blewett, John Earlston, M.B., B.S., 1924 (Univ. Melbourne), 127, Marshall Street, Ivanhoe.

Broben, James Alfred, M.B., B.S., 1924 (Univ. Melbourne), Ringwood Street, Ringwood.

Carter, Harold Ralph Charles, M.B., B.S., 1924 (Univ. Melbourne), Wattlevalley Road, East Camberwell.

Cook, Geoffrey Alleyne, M.B., B.S., 1924 (Univ. Melbourne), 16, John Street, Kew.

Craig, Clifford, M.B., B.S., 1924 (Univ. Melbourne), Melbourne Hospital, Melbourne.

Fargie, Eric Ian, M.B., B.S., 1924 (Univ. Melbourne), 279, Richardson Street, Middle Park.

Farrow, Claude William Henry, M.B., B.S., 1924 (Univ. Melbourne), Sydney Street, Sunshine.

Fisher, Ronald William Douglas, M.B., B.S., 1924 (Univ. Melbourne), 11, Mitchell Street, St. Kilda.

Graff, Roy, M.B., B.S., 1924 (Univ. Melbourne), 9, Margaret Street, Canterbury.

Judkins, Henry George, M.B., B.S., 1924 (Univ. Melbourne), 82, Canterbury Road, Surrey Hills.

Lear, D'Arcy Connor, M.B., B.S., 1924 (Univ. Melbourne), 26, Gatehouse Street, Parkville.

Little, John Philip Gregory, M.B., B.S., 1924 (Univ. Melbourne), Werribee.

Livingstone, William Gordon, M.B., B.S., 1924 (Univ. Melbourne), Warragul.

Lockwood, Lionel, M.B., B.S., 1924 (Univ. Melbourne), 105, Atherton Road, Oakleigh.

Mitchell, Hugh Glasson, M.B., B.S., 1924 (Univ. Melbourne), Sandford.

Nathan, Arthur Joseph, M.B., B.S., 1924 (Univ. Melbourne), 62, Broadway, St. Kilda.

Whitworth, James Lister, M.B., B.S., 1924 (Univ. Melbourne), Homœopathic Hospital, Melbourne.

Correspondence.

THE CONTROL OF TUBERCULOSIS.

SIR: I was much interested in the report on the control of pulmonary tuberculosis by Dr. J. Gordon Hislop. It is certainly time that in New South Wales at least something was done to attempt to coordinate the various agencies seeking to grapple with the disease and to add others which are urgently needed.

I have little personal knowledge of the position, but from what I do know, I should be inclined to say that the man without any financial reserve who is attacked by

tuberculosis, has but little chance of being successfully treated. Take the case of a wage-earner in Sydney, a clerk, a shopman, an employee in a factory or a store: He has dependants and so just pays his way. He finds himself out of sorts or has a slight hæmorrhage and consults a medical man. He is told that he has a "T.B." infection and that he must abandon his present employment and either get out into the open or go to a sanatorium.

He may convince himself that with his family responsibilities it is impossible to act upon this advice and he therefore asks for a bottle of medicine, perhaps shifts his bed out to a verandah and continues in his occupation. He struggles on for a year or two and at last has to give in and is dispatched to the Waterfall Hospital to linger and die.

If he embraces the other alternative and consents to be sent to a sanatorium, he may in one case out of six get the opportunity of entering the Queen Victoria Sanatorium at Wentworth Falls and be kept there for six months. If all his monetary resources become exhausted, the State steps in to the extent of providing 10s. a week for each of his children under fourteen years. His wife is supposed to go to work, charing or in a laundry, even though she may have four or six young children to look after. If she does not and in the majority of cases it is not possible, the whole standard of living has to be reduced. The husband may have been earning £5 or £6 a week, enough to supply the necessaries of life for the parents and four children; immediately this income is reduced to £2 and the family comes down to living in one or two rooms and the food supply is altered for the worse.

If he is not so fortunate as to get to Wentworth Falls, he goes to Waterfall and to his amazement and horror finds himself in what many of his kind regard as a hospital for the dying.

Dr. Palmer, the able and highly esteemed Medical Superintendent there, comments in his last annual report on the number of cases who come for a few days and then flee as from a plague-stricken centre. Their flight is undoubtedly due to the sight of the many patients in the last stages of the disease.

If they can be persuaded to remain, many of them improve under good feeding and open air. But whatever improvement is effected is soon lost if they return, as many of them do, to their former occupation and their ill-ventilated, stuffy homes.

When they are in the last stages of the disease and not until then, the Federal Government comes forward with its invalidity pension of 17s. 6d. a week.

With this he may elect to remain with his family and we are confronted with this paradox that while the healthy, unskilled labourer with a wife and two children must not by law be offered less than £4 2s. a week as a living allowance, this being determined after elaborate inquiry as the minimum amount with which such a family can be supplied with the bare necessaries of life, the consumptive patient with the same number of dependants and the greater need for good food and housing, is expected to manage on £1 17s. 6d. a week! I have come across a number of cases like this. In one house in Surrey Hills I discovered two such families, both living in single rooms, one a cellar twelve feet below the roadway and both the fathers well advanced in "T.B."

I have noted a number of cases where presumably a "T.B." parent has infected two, three and four of the children and it would be surprising if under such circumstances this did not happen.

To my mind our most crying need in this State to-day is a special country village in which a man in the early stage can be offered a free home for himself and his family. A cheap and flimsy shack is all that is required. The whole family should live and sleep practically in the open.

The Federal Government should amend the *Pensions Act*, so that this man from the start could get the benefit of the invalidity pension and with the children's allowance and the additions of a few fowls and a cheap and plentiful supply of milk, the patient himself would be given a reasonable chance of recovery and at any rate the risk of infection to his family and to the general public would be reduced to a minimum. To-day there are centres of infection scattered all over the slum areas of Sydney and little or nothing is being done to deal with them.

At one time the Education Department had a special nurse to visit and advise the cases whose children were being subsidized by the Department, but I believe that this has been given up.

In public health matters official wheels ofttimes grind so slowly that one wonders if they move at all.

Private effort is now attempting to bring into being this farm village which should have been instituted immediately the infectious nature of "T.B." and the value of open air were realized.

Yours, etc.,

RICHARD ARTHUR.

211, Macquarie Street, Sydney,
January 17, 1925.

THE ANATOMY OF PROCIDENTIA UTERI.

SIR: Owing to illness in the family I was able to attend but few of the sectional meetings of the last medical congress in Melbourne. And only now is an opportunity occurring to enable me to read at length the Transactions of Congress, as published in THE MEDICAL JOURNAL OF AUSTRALIA.

Under the above heading there is an able paper by Mr. F. A. Maguire, D.S.O., which among others has specially attracted my attention (Supplement to THE MEDICAL JOURNAL OF AUSTRALIA, March 29, 1924, page 167).

This paper is a valuable contribution to our knowledge of the anatomy of procidentia, but there is one point about which I venture to think the description is actually at fault. Thus the author says: "Immediately posterior to the (uterine) artery and ureter is a broad band of dense connective tissue which is forty-five millimetres wide above and twenty millimetres wide below, stretching from the pelvic wall above to the side of the uterus, vagina, bladder and rectum below."

This "broad band of dense connective tissue," I take it, is Mr. Maguire's equivalent of what is now generally known as the cardinal ligament of the uterus (one on either side); but, at the same time, this "broad band" contains (in fact, "is packed with") a large amount of smooth involuntary muscular fibre which has simply been overlooked by Mr. Maguire, by Mackenrodt and a number of others who have attempted a description of this important part of the anatomy of the uterus.

It should be remembered that when the normal uterus is drawn down towards the vulva with a vulsellum, that it is the cardinal ligaments with their contained bundles of muscular fibres that cause the uterus to return to its previous level as soon as the vulsellum is released. The sole right of the cardinal ligament to be called a ligament at all depends on the presence of these muscular fibres and on nothing else.

The first really accurate description of the anatomy and physiology of these ligaments (which embrace Mr. Maguire's "dense connective tissue bands" above referred to) was given in the course of a paper by the late Arthur Nyulasy, entitled "Looping the Cardinal Ligaments in Uterine Prolapse," with five illustrative cases and read before the Australasian Medical Congress at Auckland, New Zealand, in 1914.

The operation was after numerous personal dissections designed on the absolutely certain knowledge that the originator was shortening a band of muscullar and fibrous tissue and not merely "a dense band of connective tissue" only.

The cases operated on were brilliantly successful, but in the discussion which followed the reading of the paper, Dr. Worrall, of Sydney, thought fit to condemn the operation; yet in discussing Mr. Maguire's contribution he now states that "no abdominal operation, however radical, would cure prolapse unless the fibro-muscullar tissue was again shortened and brought together in front of the cervix and the fascia with the *levatores ani* re-united in the midline," which is practically the exact procedure advocated

by the late Arthur Nyulasy at the Auckland Congress in 1914, as may be readily seen by a reference to his paper in either the *Annals of Surgery* or THE MEDICAL JOURNAL OF AUSTRALIA for the same year.

Yours, etc.,
FRANK A. NYULASY, M.D.

Graeme, Toorak, Melbourne,
January 7, 1925.

Obituary.

SYDNEY JAMIESON.

IT is with much regret that we have to announce the death of Dr. Sydney Jamieson which occurred at Sydney on January 25, 1925.

Books Received.

INFANTILE PARALYSIS IN VERMONT, 1894-1922: A MEMORIAL TO CHARLES S. CAVERLY, M.D.; 1924. Vermont: State Department of Public Health. Royal 8vo., pp. 375.

LECTURES ON PATHOLOGY (DELIVERED IN THE UNITED STATES, 1924), by Ludwig Aschoff, M.D.; 1924. New York: Paul B. Hoeber, Incorporated. Royal 8vo., pp. xi. + 365, with 35 illustrations. Price: $5.00.

IMMUNITY IN NATURAL INFECTIOUS DISEASE, by F. d'Herelle; Authorized English Edition by George H. Smith, Ph.D.; 1924. Baltimore: Williams and Wilkins Company. Royal 8vo., pp. 400. Price: $5.00 post paid.

PHYSICAL DIAGNOSIS, by W. D. Rose, M.D.; Fourth Edition; 1924. St. Louis: The C. V. Mosby Company. Royal 8vo., pp. 755, with 319 illustrations. Price: $8.50.

PNEUMONIA: ITS PATHOLOGY, DIAGNOSIS, PROGNOSIS AND TREATMENT, by the late R. Murray Leslie, M.A., B.Sc., M.D. Edited and Revised by J. Browning Alexander, M.D., M.R.C.P. (London); 1924. London: William Heinemann (Medical Books), Limited. Demy 8vo., pp. 349. Price: 12s. 6d. net.

Medical Appointments.

Dr. N. L. Cass (B.M.A.) has been appointed District Medical Officer and Public Vaccinator, Jarnadup, Western Australia.

* * * *

Dr. Henry Roy Pearson (B.M.A.) has been appointed Health Officer, Home Secretary's Department, Brisbane.

* * * *

Dr. G. F. Read has been appointed Official Visitor of the Mental Diseases Hospital, New Norfolk, Tasmania.

* * * *

Dr. Patrick Michael O'Meara (B.M.A.) has been appointed Acting Resident Magistrate and Acting Magistrate of the Local Court, Derby, also Acting Chairman of the West Kimberley Court of Session, Western Australia.

* * * *

Dr. T. P. Byrne has been appointed District Medical Officer and Public Vaccinator at Menzies, Western Australia.

* * * *

Dr. J. C. Bennett has been appointed District Medical Officer and Public Vaccinator at Jarrahdale, Western Australia.

* * * *

Dr. L. M. Hungerford has been appointed Visitor to the Gaols in Western Australia for the year 1925, under *The Prisons Act, 1903-18.*

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi..

CHARTERS TOWERS HOSPITAL, QUEENSLAND: Resident Medical Superintendent.

MELBOURNE HOSPITAL: Medical Vacancies.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington New Zealand.

Diary for the Month.

FEB. 3.—Tasmanian Branch, B.M.A.: Council.
FEB. 4 AND 5.—Federal Committee of the British Medical Association in Australia: Meeting at Melbourne.
FEB. 6.—Queensland Branch, B.M.A.: Branch.
FEB. 10.—New South Wales Branch, B.M.A.: Ethics Committee.
FEB. 12.—Victorian Branch, B.M.A.: Council.
FEB. 12.—South Australian Branch, B.M.A.: Council.
FEB. 13.—Queensland Branch, B.M.A.: Council.
FEB. 17.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
FEB. 17.—Tasmanian Branch, B.M.A.: Council.
FEB. 17.—Illawarra Suburbs Medical Association, New South Wales.
FEB. 20.—Central Southern Medical Association, New South Wales.
FEB. 24.—New South Wales Branch, B.M.A.: Medical Politics Committee: Organization and Science Committee.
FEB. 25.—Victorian Branch, B.M.A.: Council.
FEB. 25.—Section of Surgery, New South Wales Branch, B.M.A.
FEB. 27.—Queensland Branch, B.M.A.: Council.
MAR. 3.—New South Wales Branch, B.M.A.: Ethics Committee.
MAR. 3.—Tasmanian Branch, B.M.A.: Council.
MAR. 4.—Victorian Branch, B.M.A.: Branch.
MAR. 4.—Section of Obstetrics and Gynæcology, New South Wales Branch, B.M.A.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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